Release 8

User Guide

Second Edition

"The real voyage of discovery consists not in seeking new landscapes, but in having new eyes."

Marcel Proust

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8.0.2

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Contents

JMP User Guide

1 Preliminaries

JMP Statistical Discovery . . . 1
What You Need to Know . . . 3
Learning About JMP . . . 3
Using Tutorials . . . 3
Searching in Help . . . 3
Learning About Statistical and JSL Terms . . . 4
Using the Context-Sensitive Help . . . 5
Learning JMP Tips & Tricks . . . 6
Using This Book in Combination with Other Included Books . . . 6

2 Creating and Opening Files

Data Tables, Scripts, and Journals . . . 7
Before You Start . . . 9
The Tip of the Day Window . . . 9
The JMP Starter Window . . . 10
Creating New Data Tables . . . 10
Opening Existing JMP Files . . . 11
Importing Data . . . 13
Opening Text Files . . . 13
Opening a Text File in a Text Editing Window . . . 19
Importing Text as Data . . . 21
Opening Excel and OpenOffice Files . . . 22
Opening SAS Data Sets . . . 23
Opening Data from a Database . . . 26
Retrieving Data Using SQL Statements . . . 29
Structured Query Language (SQL): A Reference . . . 30
Using the WHERE Clause Editor . . . 33
Reading in Real-Time Data (Windows and Linux Only) . . . 35
Opening Remote Files . . . 36
E-mailing Tables and Reports (Windows Only) . . . 38
Creating Journals . . . 38
Example: Making a Journal for a Presentation . . . 40

Encrypting and Decrypting Scripts 44

3 Entering, Editing, and Managing Data
Preparing for Analyses 47
Elements of JMP Data Tables 49
The Data Table Panels 49
The Data Grid 56
Specifying Data Types and Modeling Types 58
About Data Types 58
About Modeling Types 59
How to Assign Data and Modeling Types 59
Choosing Numeric Formats 61
Entering Data 66
Adding and Deleting Rows 66
Adding and Deleting Columns 67
Setting Up Initial Data Values 69
Filling Columns with Sequential Data 70
Entering Cell Formulas 71
Editing Data and Tables 72
Editing Cells 72
Editing Column Names 72
Recoding Data 72
Viewing Patterns of Missing Data 73
Finding and Replacing Cell Values 74
Reordering Columns 77
Rows and Columns Context Menus 78
Copying, Cutting, and Pasting 79
Moving and Duplicating Values 80
Using the Row Editor 81
Changing Table Names 83
Locking Tables 83
Adding Table Variables 84
Creating Scripts 87
Selecting Rows and Columns 90
Selecting Excluded, Hidden, or Labeled Rows 91
Selecting Cells with Specific Values 92
Selecting a Particular Row or Column 94
Randomly Selecting Rows 95
Inversely Selecting and Selecting All Rows 96
Locating Next and Previously Selected Rows 96
The Data Filter 97

Data Filter Control Panel . . . 97
Adding Additional Groups of Variables to the Control Panel . . . 99
Check Box Modes . . . 100
Using Nominal or Ordinal Variables as Filter Columns . . . 100
Selecting Continuous Values as Filters . . . 102
Changing the Data Table After Making Data Filter Selections . . . 103
Data Filter Menu Commands . . . 103

4 Saving Tables, Reports, and Sessions
Different Saving Methods . . . 107
Saving Data Tables . . . 109
Saving .jmp Files for use in JMP 5.1.2 or Earlier . . . 109
Saving as a Text File . . . 110
Saving as a SAS Transport File . . . 111
Saving as a SAS Data Set (Windows Only) . . . 112
Saving as a Microsoft Excel File (Windows and Macintosh Only) . . . 112
Saving Data Tables to a Database . . . 113
Saving Reports . . . 114
Saving Using the Journal Command . . . 116
Saving Using the Layout Command . . . 118
Saving Parts of a Report in a Graphic Format . . . 121
Pasting Reports into Another Program . . . 122
Saving JMP Sessions . . . 122
Saving Sessions Upon Exiting . . . 122
Saving Sessions Manually . . . 123
Working with JMP Projects (Windows Only) . . . 124
Creating a JMP Project . . . 124
Saving and Closing a JMP Project . . . 125
Opening a JMP Project . . . 126
Adding Items to a JMP Project . . . 126
Customizing the Project . . . 127
Saving a Log Window . . . 128
Specifying Where to Save Files (Windows Only) . . . 128

5 Properties and Characteristics of Data
Customizing Columns and Rows . . . 129
Assigning Characteristics to Rows and Columns . . . 131
Excluding Rows and Columns . . . 131
Hiding Rows and Columns . . . 132
Labeling Rows and Columns . . . 133
Giving Rows a Color . . . 134
Adding Markers to Rows . . . 135

Assigning Colors or Markers to Rows According to Column Values 135
Deleting All Row Characteristics 137
Locking Columns in Place 138
Giving Columns a Preselected Analysis Role 138
Icon Indicators 139
Assigning Properties to Columns 140
Assigning Currency Formats 141
Giving Columns a Formula to Compute Values 142
Locking Columns 143
Adding Notes to Columns 143
Validating Column Data 144
Using Value Labels 147
Ordering Values in Columns 149
Assigning Value Color Ranges 151
Changing Columns' Default Axis Settings 152
Defining Low and High Values (DOE Coding) for Columns 153
Setting Columns as Factors for Mixture Experiments 154
Specifying How Rows Appear in Analysis Reports 155
Entering Specification, Control, and Response Limits 156
Giving Columns a Design Role 158
Identifying Factor Changes 158
Assigning Sigma Values to Columns 159
Specifying Columns' Measuring Units 160
Selecting a Distribution Type for the Column 161
Assigning a Time Frequency to Data 162
Creating Your Own Column Property 163
Removing Properties 163
Standardizing Attributes and Properties Across Columns 164
Adding Attributes and Properties 164
Deleting Properties 165
Using Row State Columns 165
Permanently Highlighting Cells 167

6 Output Reports

Using the Report Window 169
Editing Reports 171
Accessing General Report Formatting Options 171
Showing and Hiding Parts of a Report 173
Renaming a Report 174
Increasing Font Sizes 175
Saving Results as Column Values 175

Editing Data Table Rows using the Row Editor . . . 175
Understanding the *p*-value Indicator . . . 176
Printing Reports . . . 177
Pasting Reports into Another Program . . . 177
Adding Options and Working with Analyses . . . 178
How to Access Analysis Options . . . 178
Rerunning An Analysis . . . 179
Saving Your Steps as a Script . . . 179
Formatting Report Tables . . . 180
Reordering Rows (Sorting) . . . 180
Showing and Hiding Columns . . . 181
Adding Outlines and Borders . . . 181
Changing Numeric Formats and Field Widths . . . 182
Changing Table Names and Column Headings . . . 183
Turning a Report Table Into a Data Table . . . 183
Turning a Report Table Into a Matrix . . . 184
Selecting Points in Plots . . . 185
Selecting Rows and Columns in Plots, Charts, and Graphs . . . 185
Selecting a Rectangular Area of Points . . . 185
Selecting an Irregular-Shaped Area of Points . . . 186
Using Markers . . . 187
Changing Marker Shape . . . 187
Changing Marker Colors . . . 188
Changing Marker Size . . . 188
Changing the Marker Drawing Mode and Transparency . . . 189
Adding Outlines Around Markers . . . 190
Specifying Marker Transparency . . . 190
Excluding and Hiding Markers . . . 191
Adding Labels to Markers . . . 192
Changing Marker Shape or Colors Based On Values . . . 193
Removing the Legend . . . 195
Altering Plot and Chart Appearances . . . 195
Resizing Plots and Graphs . . . 195
Zooming In and Out . . . 196
Changing Line Widths . . . 197
Changing the Background or Histogram Bar Color . . . 198
Displaying Coordinates . . . 199
Scrolling and Scaling Axes . . . 199
Customizing Axes and Axis Labels . . . 200
Changing the Order of Values . . . 205
Customizing Tick Marks and Tick Mark Labels . . . 205
Adding Reference Lines . . . 210
Adding Elements to a Report . . . 211

Adding an Annotative Note . . . 211
Adding Shapes . . . 213
Adding Graphics (Windows and Macintosh Only) . . . 216
Adding and Editing Graphics Scripts . . . 216

7 Reshaping Data
Subset, Concatenate, Join, and More . . . 221
Creating a Subset Data Table . . . 223
Creating a Subset Data Table from a Report . . . 225
Sorting Data Tables . . . 225
Stacking Columns . . . 227
Example of Stacking into One Column . . . 229
Example of Stacking Into More Than One Column (Using the Multiple Series Stack Option) 230
Example of Contiguous Stacking . . . 231
Splitting Columns . . . 232
Examples of Splitting Columns . . . 233
Transposing Rows and Columns . . . 237
Examples of Transposing . . . 239
Concatenating Data Tables . . . 241
Example of Concatenating Data Tables . . . 243
Joining Data Tables . . . 244
How to Join Data Tables . . . 244
Examples of Joining Data Tables . . . 246
Updating a Data Table . . . 256
Example of Updating a Data Table . . . 257

8 Summarizing Data
The Summarize and Tabulate Commands . . . 261
Summarizing Columns . . . 263
Creating a Summary Table . . . 264
Adding a Statistics Column to an Existing Summary Table . . . 266
Explanation of Statistics . . . 266
Example of Adding a Statistics Column . . . 268
Tabulating Data . . . 269
How to Create a Table in Tabulate . . . 270
Elements of a Table in Tabulate . . . 271
Clicking and Dragging Items . . . 274
Inserting a Grouping Column . . . 275
Inserting an Analysis Column . . . 275
Using the Window . . . 275
Editing Tables in Tabulate . . . 277
Additional Tabulate Options . . . 279

Example of Tabulating Data 280

9 Formula Editor
Constructing a Formula 285
Creating a Formula 287
Referencing Columns and Table Variables 288
Using Local Variables 289
Incorporating Parameters 289
Inserting Constants 290
Adding Operators 291
Keypad Reference 293
Using Functions 294
Referencing Rows 297
Adding Numeric Functions 297
Inserting Logarithmic or Trigonometric Functions 298
Adding Character Arguments and Returning Character Strings 300
Matching Character Patterns 300
Comparing Values 301
Using Conditional Clauses 302
Calculating Quantiles and Probabilities 303
Calculating Discrete Probabilities 304
Computing Statistical Functions 305
Generating Random Numbers 306
Using Dates and Times 306
Processing Row State Data 307
Using Assignment Functions 309
Ordering Expressions in Formulas 310
Building a Formula in Order of Precedence 310
Using Formula Editor Options 311
Calculating Derivatives 312
Simplifying Complex Formulas 312
Evaluating Formulas 313
Ignoring Errors 314
Viewing a Formula's Values from the Formula Editor 315
Viewing a Formula in JSL 315
Editing Formulas 315
Correcting Mistakes 316
Selecting Expressions 316
Deleting Functions 316
Cutting, Copying, and Pasting 317
Clicking and Dragging 317
Customizing Formulas 318

Changing the Font Size . . . 318
Hiding and Showing Boxing . . . 318
Changing a Formula's Orientation . . . 319
Opening and Closing Arguments . . . 320
Examples and Tutorials . . . 321
Using Basic Formula Editor Features . . . 321
Using Local Variables in a Formula . . . 323
Using the Munger Function . . . 324
Using the Match Conditional Function . . . 325
Using the Delete Expression Key . . . 326
Using Keyboard Shortcuts . . . 327
Glossary of Terms . . . 327

10 Personalizing JMP
Customize Preferences, Toolbars, and Menus . . . 329
Changing Startup Preferences . . . 331
Tip of the Day Window . . . 331
Splash Window . . . 331
JMP Starter Window . . . 331
The Window List (Windows Only) . . . 332
Saving Journals in a compressed format . . . 332
Preferences for Opening Excel Files . . . 333
Importing Excel Labels as JMP Column Names (Windows and Macintosh Only) . . . 333
Excel Workbook/Worksheet Selection (Windows and Macintosh Only) . . . 333
Changing Formula and Scripting Options . . . 334
Formula Evaluation . . . 334
Script Evaluation . . . 335
Saving Scripts in Different Languages . . . 335
Changing Data Table Options . . . 335
Highlight Movement . . . 335
Scroll Bar Styles (Windows Only) . . . 336
Extended File Format . . . 336
Numeric Formats . . . 337
Data Table Print Format . . . 337
Toolbar Positions (Windows Only) . . . 337
Changing Report Options . . . 337
Customizing Analysis Settings . . . 337
Menu Tips (Windows Only) . . . 338
Dates, Times, Names and Notes . . . 338
Hover Help . . . 339
Table Styles . . . 339
Marker Sizes, Shapes, and Themes . . . 339
Color Themes . . . 339
Setting Graph Height . . . 339

Closing and Saving Sessions . . . 340
Closing and Saving Reports . . . 340
Laser Pointer Options . . . 341
Marker Drawing Speed Threshold . . . 341
Saving Text Files Without Using Unicode . . . 342
Changing Color Schemes and Languages . . . 342
Changing Graph Colors . . . 342
Changing Window Colors (Windows and Linux Only) . . . 343
Highlighting Title Bars (Windows Only) . . . 343
Changing the Display Language . . . 343
Customizing Fonts . . . 344
Changing Font Types and Sizes . . . 344
Using Underlines and Strikeouts on Windows . . . 345
Using Greek Letters and Math Symbols . . . 345
Specifying Graphic Formats . . . 346
Specialized Graphics Settings (Windows Only) . . . 347
Adjusting Communications Settings (Windows and Linux Only) . . . 347
Adjusting Proxy Settings (Linux Only) . . . 348
Specifying File Locations and Associations . . . 348
Specifying File Locations (Windows and Linux Only) . . . 349
Resetting the File Associations (Windows Only) . . . 350
Customizing Text Import/Export Options . . . 350
Specifying Settings for SAS Integration . . . 351
Preserving variable names and formats . . . 353
Controlling JMP Updates . . . 353
Personalizing Toolbars (Macintosh) . . . 354
Personalizing Toolbars (Windows and Linux) . . . 354
Showing/Hiding Toolbars . . . 355
Rearranging Toolbars . . . 357
Rearranging Buttons . . . 358
Deleting Toolbars . . . 359
Deleting Buttons . . . 360
Adding Toolbars . . . 360
Adding Buttons . . . 362
Merging Menus from Earlier Versions (.jmpcmd Files) . . . 366
Importing Customized Menus and Toolbars (.jmpmenu Files) . . . 366
Customizing Menus (Windows and Linux Only) . . . 366
Rearranging Menu Items . . . 367
Deleting Menus . . . 369
Adding Menus . . . 369
Adding Menu Items . . . 370
Renaming Menu Items . . . 373
Saving Menus and Toolbars (Windows and Linux) . . . 374

Using a Separate Customized File (Windows) . . . 374
Changing the Default Location of .jmpmenu File (Windows) . . . 375

11 SAS Integration
Working with SAS data from JMP . . . 377
Connecting to SAS . . . 379
Connect to a SAS Metadata Server . . . 379
Connect to a SAS Server on a Remote Machine . . . 382
Connect to SAS on Your Local Machine (Windows Only) . . . 383
Opening SAS Data Sets . . . 383
Browsing SAS Data Information . . . 384
Open a SAS Data Set in JMP . . . 386
Running Stored Processes . . . 390
Submitting SAS Code . . . 391
Generating ODS Results . . . 393
Retrieving Generated SAS Data Sets . . . 394

A JMP Starter
A Review of Categories and Buttons . . . 397
Overview of the JMP Starter Window . . . 399
The File Category . . . 399
The Basic Category . . . 401
The Model Category . . . 402
The Multivariate Category . . . 404
The Reliability Category . . . 406
The Graph Category . . . 407
The Surface Category . . . 410
The Measure Category . . . 411
The Control Category . . . 412
The DOE Category . . . 413
The Tables Category . . . 415
The SAS Category . . . 417

B Main Menu
A Description of Commands . . . 419
The JMP Menu (Macintosh Only) . . . 421
The File Menu . . . 421
The Edit Menu . . . 424
The Tables Menu . . . 427
The Rows Menu . . . 428
The Cols Menu . . . 430
The DOE Menu . . . 432

The Analyze Menu 434
The Graph Menu 440
The Tools Menu 444
The View Menu 446
On Microsoft Windows and Linux 446
On Macintosh 447
The Window Menu 448
On Microsoft Windows and Linux 448
On Macintosh 449
The Help Menu 450
The Layout Menu 451

C Formula Functions Reference
A Description of Functions Available in JMP 453
Row Functions 455
Numeric Functions 457
Transcendental Functions 457
Trigonometric Functions 459
Character Functions 460
Character Pattern Functions 465
Comparison Functions 467
Conditional Functions 468
Probability Functions 472
Discrete Probability Functions 480
Statistical Functions 481
Random Functions 485
Date Time Functions 488
Row State Functions 489
Assignment Functions 493
Parametric Model Functions 493

Index
JMP User Guide 495

Credits and Acknowledgments

Origin

JMP was developed by SAS Institute Inc., Cary, NC. JMP is not a part of the SAS System, though portions of JMP were adapted from routines in the SAS System, particularly for linear algebra and probability calculations. Version 1 of JMP went into production in October, 1989.

Credits

JMP was conceived and started by John Sall. Design and development were done by John Sall, Chung-Wei Ng, Michael Hecht, Richard Potter, Brian Corcoran, Annie Dudley Zangi, Bradley Jones, Craige Hales, Chris Gotwalt, Paul Nelson, Xan Gregg, Jianfeng Ding, Eric Hill, John Schroedl, Laura Lancaster, Scott McQuiggan, and Peng Liu.

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Chapter 1

Preliminaries

JMP Statistical Discovery

JMP is statistical software that gives you a graphical interface to display and analyze data. JMP is for interactive statistical graphics and includes:

- A spreadsheet for viewing, editing, entering, and manipulating data
- A broad range of graphical and statistical methods for data analysis
- Extensive design of experiments capabilities
- Options to select and display subsets of the data
- Data management tools for sorting and combining tables
- A formula editor for each table column to compute values
- A way to group data and compute summary statistics
- Special plots, charts, and communication capabilities for quality improvement techniques
- Tools for moving analysis results between applications
- A scripting language for saving frequently used routines
- Interfaces to SAS

JMP is easy to learn. Statistics are organized into logical areas with appropriate graphs and tables, which help you find patterns in data, identify outlying points, or fit models. Appropriate analyses are defined and performed for you, based on the types of variables you have and the roles they play.

JMP offers descriptive statistics and simple analyses for beginning statisticians and complex model fitting for advanced researchers. Standard statistical analysis and specialty platforms for design of experiments, statistical quality control, ternary and contour plotting, and survival analysis provide the tools you need to analyze data and see results quickly.

Contents

What You Need to Know 3
Learning About JMP 3
Using Tutorials 3
Searching in Help 3
Learning About Statistical and JSL Terms 4
Using the Context-Sensitive Help 5
Learning JMP Tips & Tricks 6
Using This Book in Combination with Other Included Books 6

What You Need to Know

Before you begin using JMP, you should be familiar with:

- Standard operations and terminology such as *click*, *double-click*, *Ctrl-click* and *Alt-click* (*Command-click* and *Option-click* on the Macintosh and *Shift-Alt-click* on Linux), *Shift-click*, *drag*, *select*, *copy*, and *paste*.
- How to use menu bars and scroll bars, how to move and resize windows, and how to manipulate files in the desktop. If you are using your computer for the first time, consult the reference guides that came with it for details.
- Minimal statistics. Even though JMP has many advanced features, you only need a minimal background of formal statistical training. All analysis platforms include graphs with options that help you review and interpret the results. Each platform also includes access to help windows that offer general help and some statistical details.

Learning About JMP

If you are familiar with JMP, you might want to know only what's new. The *JMP New Features* document gives a summary of general changes and additions. To learn more about JMP, use the recommendations in the following sections.

Using Tutorials

JMP provides three types of tutorials:

Beginners Tutorial The beginner's tutorial steps you through the JMP interface and explains the basics of how to use JMP. It is accessible through the Tip of the Day window, which appears when you start JMP. To start the tutorial from the Tip of the Day window, click **Enter Beginners Tutorial**. Or, from within JMP, start the tutorial by selecting **Help > Tutorials > Beginners Tutorial**.

Specific Analysis Tutorials Tutorials that step you through creating an analysis in JMP are found under **Help > Tutorials**. Tutorials describe how to create a chart, how to run a design of experiment (DOE), and more.

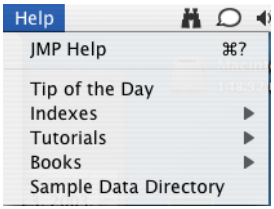
JMP Introductory Guide The *JMP Introductory Guide* is a collection of tutorials designed to help you learn JMP strategies. If you did not receive a printed copy of this book, view the .pdf file by selecting **Help > Books > Introductory Guide**. By following along with these step-by-step examples, you can quickly become familiar with JMP menus, options, and report windows.

Searching in Help

You might want help on a specific topic, and you want to search the online Help for that topic. The main menu bar contains a Help menu, which provides the appropriate searching capabilities:

Windows and Linux Help Menu

Macintosh Help Menu



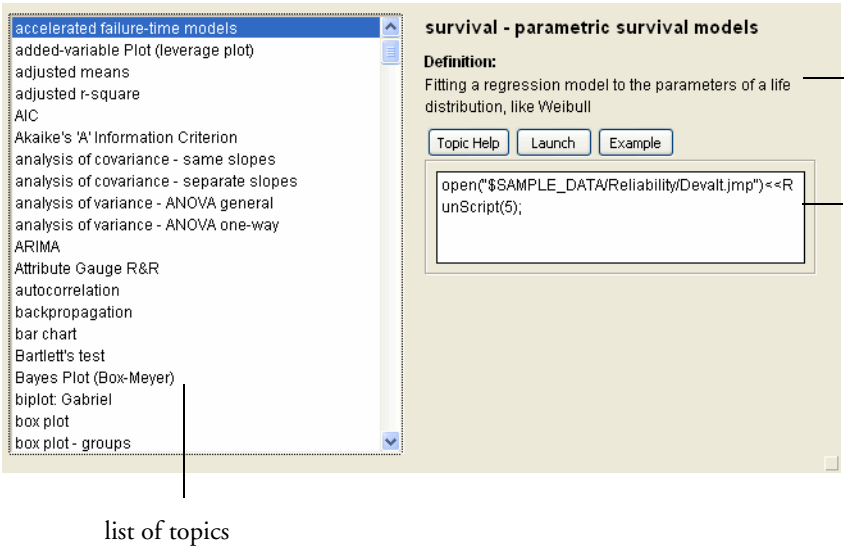
On Windows and Linux, the **Help > Contents**, **Help > Search**, and **Help > Index** commands access the JMP Help system. The Help system provides navigable online JMP documentation.

On the Macintosh, the **Help > JMP Help** command displays a list of JMP help items with search capabilities and a table of contents.

Learning About Statistical and JSL Terms

The **Help > Indexes** menu displays the following sources for your reference:

Statistics Index Accesses references that give definitions of statistical terms.



Once you are in the Statistics Index window, click the **Topic Help** button to go to the place in the online Help that describes the highlighted topic. Click **Launch** to run the script that corresponds to the item you have highlighted in the list. Click **Example** to view an example of the highlighted topic.

JSL Functions Index Presents a list of JSL functions, such as Sin, Cos, Sqrt, and Abbrev Date that you would use when writing JSL. Highlight a function name to see a description of the function in the window on the right. Click the **Topic Help** button to locate the topic in the online Help.

Object Scripting Index Presents a list of JSL objects. These are scriptable JSL building blocks. Highlight an object name and messages the object recognizes appear in the window on the right.

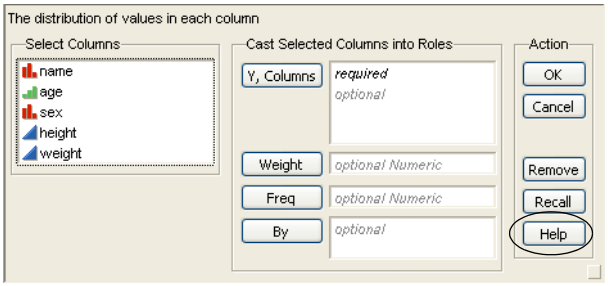
DisplayBox Scripting Index Presents a list of the elements that make up a JMP report. These elements are the JSL building blocks with which you build output. Highlight a Display Box and available messages for each object appear in the window on the right.

Using the Context-Sensitive Help

To use the online Help system, select one of the following methods:

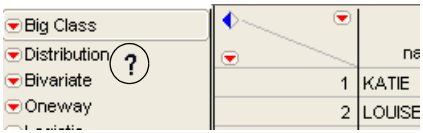
- Select **Help** from analysis construction windows (as shown in Figure 1.1) and report windows.

Figure 1.1 Help Is Available



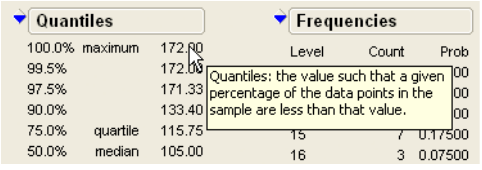
- Select the help tool (?) from the **Tools** menu and click a place in a data table or report on which you need assistance (Figure 1.2). Context-sensitive help tells about the items in the area you clicked.

Figure 1.2 Use the Help Tool for Context-Sensitive Help



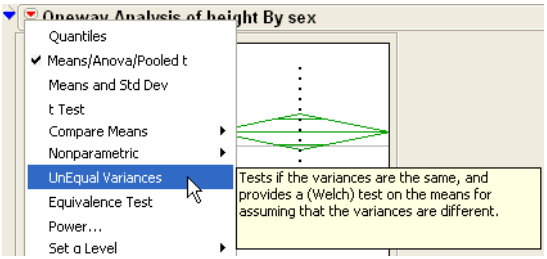
- In some reports, make a small circle with your cursor to reveal information about the item in the area.

Figure 1.3 Making a Circle with the Cursor Displays Help



- In some menus, hold the cursor on menu items to reveal information about the menu item.

Figure 1.4 Display a Description of Menu Items


Oneway Analysis of height By sex
Quantiles
Means/Anova/Pooled t
Means and Std Dev
t Test
Compare Means
Nonparametric
UnEqual Variances
Equivalence Test
Power...
Set α Level
Tests if the variances are the same, and provides a (Welch) test on the means for assuming that the variances are different.

Learning JMP Tips & Tricks

When you first start JMP, you see the Tip of the Day window. This window provides tips about using JMP that you might not know.

To turn off the Tip of the Day, clear the **Show tips at startup** check box. To view it again, select **Help > Tip of the Day**. See "The Tip of the Day Window," p. 9 for details.

Also use the *JMP Quick Reference Card* to learn more advanced commands in JMP. View this document by selecting **Help > Books > JMP Quick Reference Card**.

Using This Book in Combination with Other Included Books

The book you are reading now is the *JMP User Guide*. It includes the following topics:

- reference material for creating data tables
- working with analysis reports
- a description of all JMP menus
- an explanation of data table manipulation
- a description of the formula editor and how to use it

See the following manuals for further documentation of JMP:

- The *JMP Introductory Guide* provides a tutorial and walks you through examples using JMP.
- The*JMP Statistics and Graphics Guide* gives documentation of the **Analyze** and **Graph** menus.
- The *JMP Design of Experiments* covers the **DOE** menu, the experimental design analysis in JMP.
- The *JMP Scripting Guide* is a reference guide to the JMP Scripting Language (JSL) that lets you automate action sequences.

You can view the .pdf files for each of these books by selecting **Help > Books**.

Chapter 2

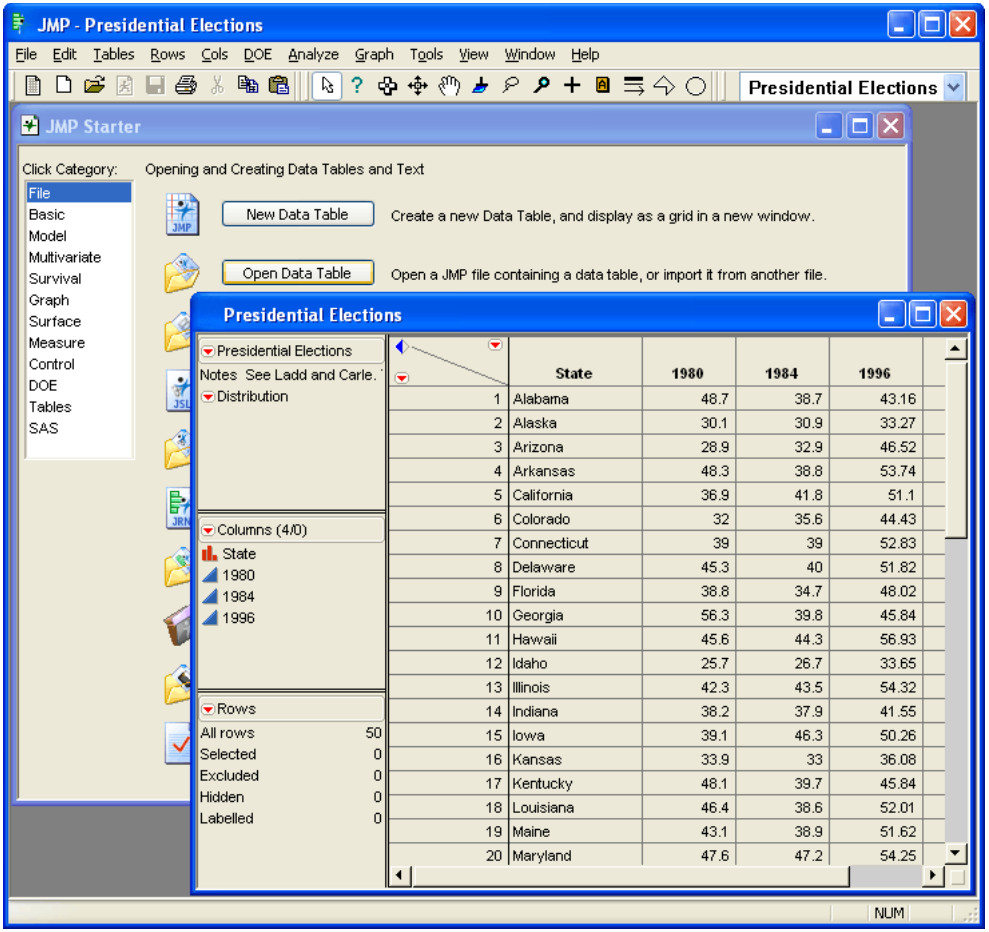
Creating and Opening Files

Data Tables, Scripts, and Journals

The first thing to do in JMP is open or create a JMP data table:

- To import an existing file into JMP, either click the **Open Data Table** button in the JMP Starter or select **File > Open**. See "Opening Existing JMP Files," p. 11, for details.
- To manually type data into JMP, either click the **New Data Table** button in the JMP Starter or select **File > New > Data Table**. This creates an empty JMP data table, and you can start typing in your data. See "Creating New Data Tables," p. 10, for details.

This chapter tells you more about creating a new data table, how to import data into new tables, how to export data, and how to get further assistance.



Contents

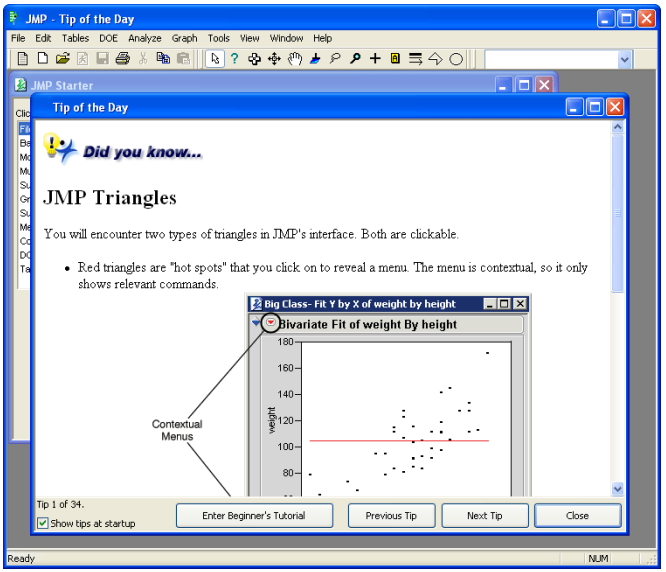
Before You Start 9
The Tip of the Day Window 9
The JMP Starter Window 10
Creating New Data Tables 10
Opening Existing JMP Files 11
Importing Data 13
Opening Text Files 13
Opening a Text File in a Text Editing Window 19
Importing Text as Data 21
Opening Excel and OpenOffice Files 22
Opening SAS Data Sets 23
Opening Data from a Database 26
Retrieving Data Using SQL Statements 29
Structured Query Language (SQL): A Reference 30
Using the WHERE Clause Editor 33
Reading in Real-Time Data (Windows and Linux Only) 35
Opening Remote Files 36
E-mailing Tables and Reports (Windows Only) 38
Creating Journals 38
Example: Making a Journal for a Presentation 40
Encrypting and Decrypting Scripts 44

Before You Start

Before you begin using JMP, familiarize yourself with its initial windows: the Tip of the Day window and the JMP Starter window.

The Tip of the Day Window

When JMP opens, you see the Tip of the Day window. This window provides tips about using JMP that you might not know. Some tips are basic introductory information, and others give hidden power features that you should learn after getting comfortable with the basics.


JMP - Tip of the Day
File Edit Tables DOE Analyze Graph Tools View Window Help
JMP Starter
Tip of the Day
Did you know...
JMP Triangles
You will encounter two types of triangles in JMP's interface. Both are clickable.
Red triangles are "hot spots" that you click on to reveal a menu. The menu is contextual, so it only shows relevant commands.
Big Class- Fit Y by X of weight by height
Bivariate Fit of weight By height
Contextual Menus
weight
Tip 1 of 34.
Show tips at startup
Enter Beginner's Tutorial
Previous Tip
Next Tip
Close
Ready
NUM

The Tip of the Day window has the following features:

- **Show tips at startup** When checked, displays the **Tip of the Day** window each time you start JMP. This option is also accessible in **File** (JMP on the Macintosh) **> Preferences > General > Show Tip of the Day at Startup**.
- **Enter Beginner's Tutorial** Click to start the beginner's tutorial. This tutorial introduces beginners to JMP and how its commands and controls work. To access the other tutorials, select **Help > Tutorials**.
- **Previous Tip** Returns to the previous tip in the **Tip of the Day** window.
- **Next Tip** Advances to the next tip in the **Tip of the Day** window.

The Tip of the Day folder is installed with JMP. It contains HTML files and images that are used for producing the Tip of the Day window.

Note: Add your own tips by naming them tipXX.htm, where XX is the next unused number in a tip filename.

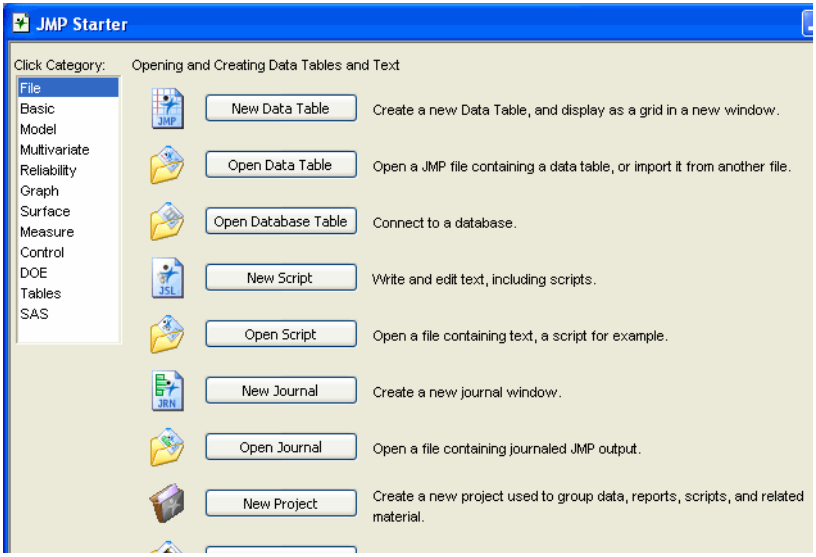
To open the Tip of the Day window after closing it, select **Help > Tip of the Day**.

The JMP Starter Window

Upon startup, the JMP Starter window is located behind the Tip of the Day window. Most of the commands found on the JMP Starter are a duplication of commands found in the main menu and toolbars.

See "Overview of the JMP Starter Window," p. 399, for details.

To open and close the JMP Starter, select **View** (**Window** on the Macintosh) **> JMP Starter**. You can also stop the JMP Starter from appearing upon startup by selecting **File** (**JMP** on the Macintosh) **> Preferences** and unchecking **Initial JMP Starter Window**.



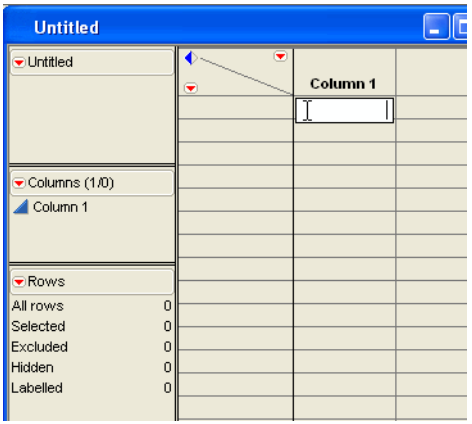
Creating New Data Tables

To analyze data, you must first create a data table.

To create a new data table:

1. Select **File > New > Data Table**. This shows an empty data table with no rows and one numeric column, labeled Column 1.
2. Move the cursor onto a cell.
3. Click the cell. The cursor becomes an I-beam ( ) while in the cell, as shown in Figure 2.1.

Figure 2.1 A New Data Table



4 Enter a value.

There are several ways to fill a table with values:

- Create new rows and columns and type or paste data into the data grid. (See "Adding and Deleting Rows," p. 66.)
- Construct a formula to calculate column values. (See "Creating a Formula," p. 287.)
- Import data from another application. (See "Importing Data," p. 13.)
- Copy values from another application and paste them into the table.
- Use a measuring instrument to read external measures. (See "Reading in Real-Time Data (Windows and Linux Only)," p. 35.)
- Drag columns from one table to another.

See "Entering, Editing, and Managing Data," p. 47, for details about how to format, edit, and work with data tables.

Opening Existing JMP Files

If you want to import a file that is a JMP data table (.jmp), script (.jsl), journal (.jrn), or report (.jrp):

1 Select **File > Open**.
2 Select the file type from the window that appears.

File Type	Operating System	Instructions for Opening
JMP data table	Windows	From the **Files of type** list, select **JMP Data Tables**. The highlighted table's notes and number of rows and columns appear at the bottom of the window. Click the box beside **Select Columns** to display only certain columns in the data table when opened.
	Macintosh	The highlighted table's notes and number of rows and columns appear at the bottom of the window. Click the box beside **Select columns before opening** to display only certain columns in the data table when opened.
	Linux	From the **Filter** list, select ***.jmp (JMP Data Table)**. Note that if you select a file or folder and click **Next**, you see the highlighted table's notes and number of rows and columns. Click the box beside column names to display them in the data table when opened.
JMP script	Windows	1 From the **Files of type** list, select **JMP Files** or **JMP Scripts**. 2 Select a script. The **Run this script only** option appears at the bottom of the window. Check this option to automatically begin running the script when it is opened.
	Macintosh	After selecting a script, the **Run after opening** option appears at the bottom of the window. Check it to automatically begin running the script when it is opened.
	Linux	From the **Filter** list, select ***.jsl (JSL Script)**.
JMP journal, report, or project	Windows	From the **Files of type** list, select **JMP Journals**, **JMP Reports**, or **JMP Projects**.
	Macintosh	No further action is necessary.
	Linux	From the **Filter** list, select ***.jrn (JMP Journal)** or ***.jrp (JMP Report)**.

3 Highlight the name of the file you would like to open.

4 Click **Open** (**Finish** on Linux).

Note: JMP can open JMP files that are version 3 and later.

Importing Data

If you have data that exists in a format other than a .jmp file, you can import it and save it as a JMP data table. The list below gives the file types you can import into JMP.

- Microsoft Excel (.xls), Microsoft Excel 2007 (.xlsm, .xlsx, .xlsb) on Windows with a V3+ compliant ODBC driver
- Text (.txt)
- Text with comma-separated values (.csv)
- Tabbed separated values (.tsv)
- SAS transport (.xpt, .stx) files
- Minitab files (.mtw, .mtp)
- FACS (.fcs)
- Microsoft Access Database (.mdb) on Windows with a V3+ compliant ODBC driver
- Database (dBASE) (.dbf, .ndx, .mdx) on Windows with a V3+ compliant ODBC driver
- MySQL, Oracle, and PostgreSQL on Linux with a V3 + Unicode compliant ODBC driver
- OpenOffice spreadsheets (.sxc) on Linux
- Data (.dat) files
- HTML (.htm, .html)
- SAS versions 6-9 (.sd2, .sd5, .sd7, .sas7bdat) on Windows
- SAS version 6 (.sas7bdat, .ssd, .ssd01, .saseb$data) on Macintosh and Linux

Note: Opening a SAS data set directly is different from connecting to a SAS data set through integration with a SAS Server. See "SAS Integration" chapter for details.

Opening Text Files

You can open text data files with the extensions .txt, .dat, .csv, and .tsv. Text files can be delimited using almost any character, or they can be fixed width files. JMP provides three different ways to open these files: by determining the data arrangement for you, by enabling you to determine the data arrangement, or by opening the file in a text editor within JMP.

Table 2.1 lists the steps involved in opening text files.

Table 2.1 Opening Text Files

	Automatically Determining Data Arrangement	Manually Specifying Data Arrangement
Windows	1 Select **File > Open**. 2 From the **Files of type** field, select **Text Files**. 3 To use the import rules as set in Preferences, select **Data, using Text Import Preferences**. (See "Customizing Text Import/Export Options," p. 350.) To have text import use its best guess to arrange the data, select the **Data, using best guess** option. If you select the option **Select this filter the next time this dialog is invoked**, the default file type choice is set to the option you select in the **Files of type** list. 4 Select the file you want to open. 5 Click **Open**.	1 Select **File > Open**. 2 From the **Files of type** field, select **Text Files**. 3 Select **Data with Preview**. 4 Select the file you want to open. 5 Click **Open**. 6 Complete the Text Import window. See "Understanding the Text Import Preview Window," p. 15, for details. 7 Click **Import**.
Macintosh	1 Select **File > Open**. 2 Select the file you want to open. 3 From the **Open As** field, select **Data (Best Guess)** or **Data (Using Preferences)**. 4 Click **Open**.	1 Select **File > Open**. 2 Select the file you want to open. 3 From the **Open As** field, select **Data (Using Preview)**. 4 Click **Open**. 5 Complete the Text Import Preview window. See "Understanding the Text Import Preview Window," p. 15, for details. 6 Click **Import**.

Table 2.1 Opening Text Files (Continued)

	Automatically Determining Data Arrangement	Manually Specifying Data Arrangement
Linux	There is no way to determine the data arrangement automatically.	1 Select **File > Open**. 2 From the **Filter** field, select – ***.txt (Fixed Width Text)** if your file has fixed text line widths, or – ***.txt*.csv (Delimited Text)** if your file contains delimiters (characters that signify the end of a text line) 3 Select the file you want to open. 4 Click **Next**. 5 Complete the Text Import Options window. See "Understanding the Text Import Preview Window," p. 15, for details. 6 Click **Finish**.

Understanding the Text Import Preview Window

When you open a file, JMP detects the file's structure and displays the appropriate Text Import window type. If JMP opens the wrong type of window, such as the Fixed Width window when your file is delimited, click the **Delimited Fields** or **Fixed Width Fields** radio button to access the other import type.

Below are descriptions of the windows' elements.

Figure 2.2 Text Import Preview for Fixed Width Files

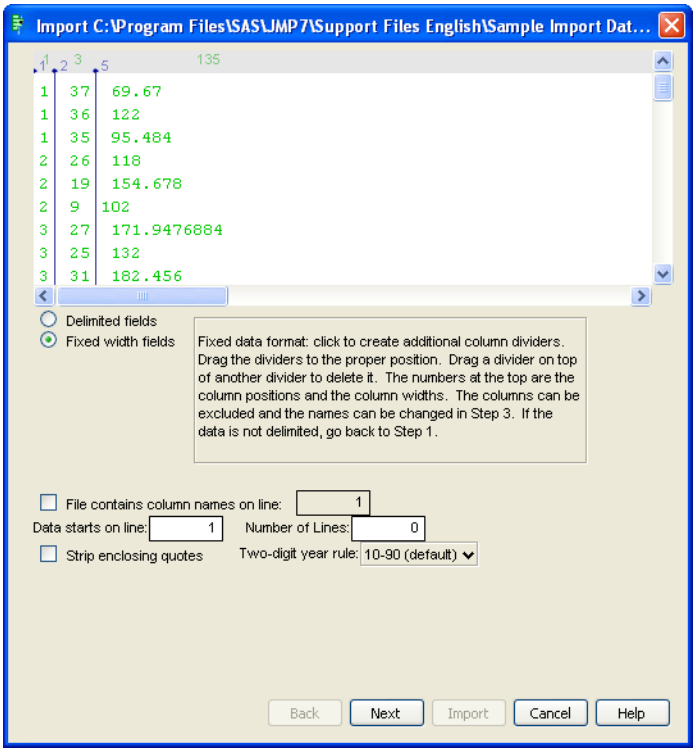
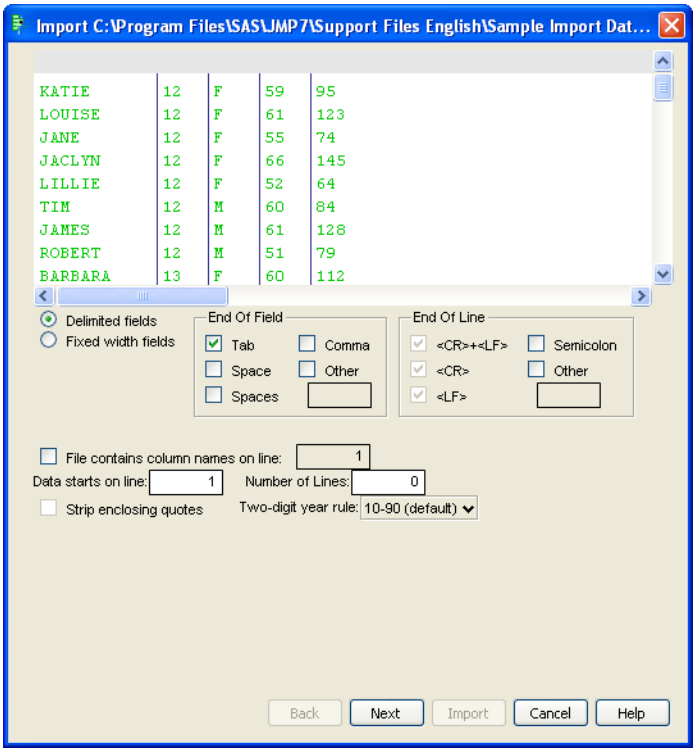

Import C:\Program Files\SAS\JMP7\Support Files English\Sample Import Dat...
1 2 3 5 135
1 37 69.67
1 36 122
1 35 95.484
2 26 118
2 19 154.678
2 9 102
3 27 171.9476884
3 25 132
3 31 182.456
Delimited fields
Fixed width fields
Fixed data format: click to create additional column dividers. Drag the dividers to the proper position. Drag a divider on top of another divider to delete it. The numbers at the top are the column positions and the column widths. The columns can be excluded and the names can be changed in Step 3. If the data is not delimited, go back to Step 1.
File contains column names on line: 1
Data starts on line: 1
Number of Lines: 0
Strip enclosing quotes
Two-digit year rule: 10-90 (default)
Back
Next
Import
Cancel
Help

Figure 2.3 Text Import Preview for Delimited Files



End of Field (Available only in the Delimited Import window) Click the box beside the character found in the text file that serves as the delimiter signifying the end of a field. Click the box beside **Other** and enter a character if the appropriate character is not listed.

End of Line (Available only in the Delimited Import window) Click the box beside the character found in the text file that serves as the delimiter signifying the end of a line (row). Click the box beside **Other** and enter a character if the appropriate character is not listed. Note that if double-quotes are encountered when importing text data, the delimiter rules change to look for an end double-quote. Other text delimiters, including spaces embedded within the quotes, are ignored and treated as part of the text string.

Strip enclosing quotes is selectable only on fixed-width imports. Click this box if you want JMP to remove quotation marks that enclose data in the text file.

Two-digit year rule Use the drop-down menu to specify if you want to use:

- **10-90 (default)** Use the table below to understand how the 10-90 rule works in JMP.

Last Two Digits of Current Year (as Shown on Your Computer)	Two-Digit Date in Text File	JMP Display Format
Between 11 and 89	not applicable	The current century is used as the first two digits.
Between 00 and 10	Less than 90	The current century is used as the first two digits.
	Between 90 and 99	The previous century is used as the first two digits.
Between 90 and 00	Between 0 and 10	The next century is used as the first two digits.
	Between 11 and 99	The current century is used as the first two digits.

- **19xx** JMP adds 19 before dates in the file that have only two digits that indicate the year.
- **20xx** JMP adds 20 before dates in the file that have only two digits that indicate the year.
- **Custom** Lets you open and implement a JSL script that customizes how JMP handles dates.

Number of Lines Specify the number of lines (rows) the imported file contains.

File contains column names on line Tell JMP where to find data to use as column names. For example, if the column names in your text file are on line (row) 3, select this option and type 3 in the box. Otherwise, JMP uses the data in the first line of the imported file as the column name in the JMP data table or takes the first line as data.

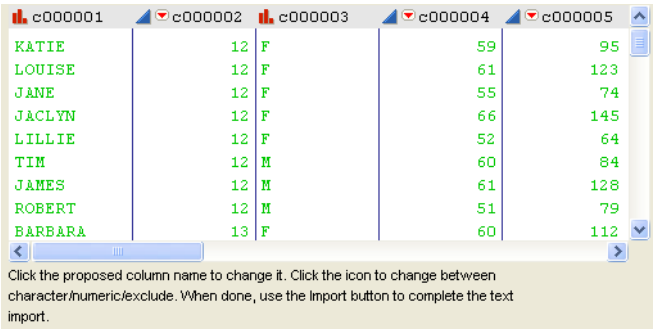
Next Button moves to the next screen so you can name the columns and set their types.

After clicking the **Next** button, a screen appears that shows the text import's best guess for column types. To change these guesses,

- Click on the modeling icon to change the modeling type. Clicking cycles between the modeling type and exclude. Exclude means the column will not be imported.
- Double-click on the name to edit the column's name.

The top of the Text Import window shows a preview of the text file as it will appear when imported into a JMP data file. Click the **Import** button to import the data.

Figure 2.4 Text Import Screen Two


c000001
c000002
c000003
c000004
c000005
KATIE 12 F 59 95
LOUISE 12 F 61 123
JANE 12 F 55 74
JACLYN 12 F 66 145
LILLIE 12 F 52 64
TIM 12 M 60 84
JAMES 12 M 61 128
ROBERT 12 M 51 79
BARBARA 13 F 60 112
Click the proposed column name to change it. Click the icon to change between character/numeric/exclude. When done, use the Import button to complete the text import.

Opening a Text File in a Text Editing Window

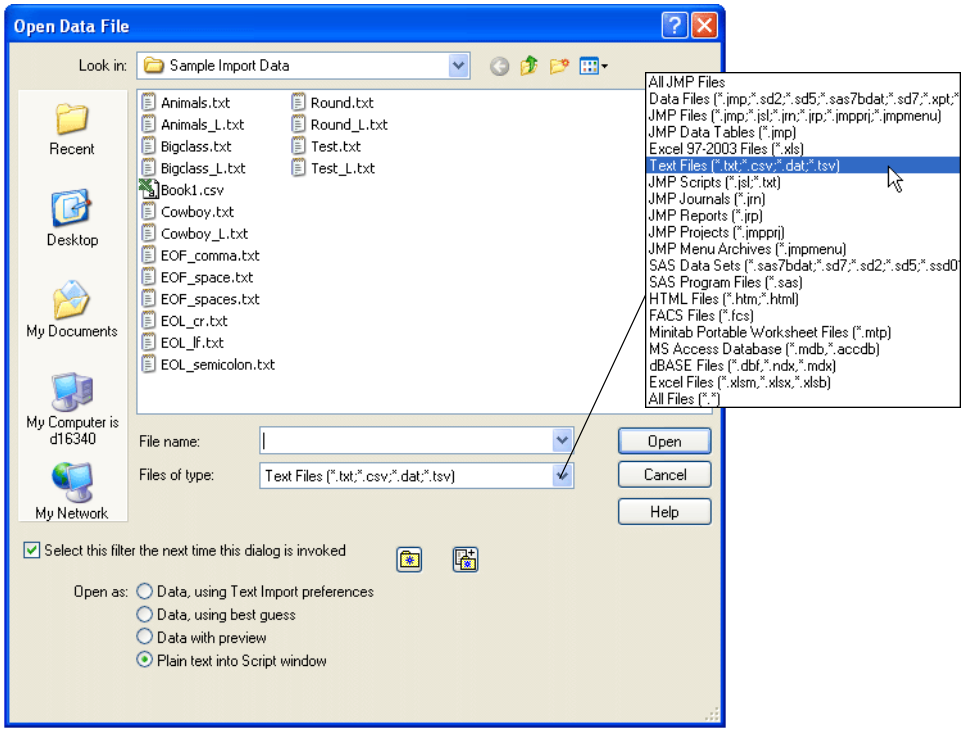
On Macintosh and Windows, you can open a text file in a simple text editing window instead of a JMP data table.

To open a text file in a text editing window on Windows:

1 Select **File > Open**.

2 From the **Files of type** list (Figure 2.5), select **Text Files**, which is the type of file you want to import.

Figure 2.5 Select Text Files

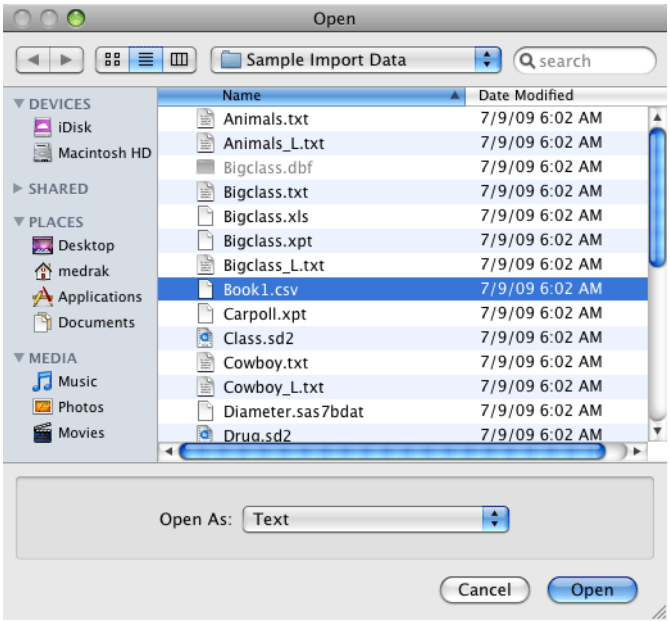


3 To set the default option in the **Files of Type** list to **Text Files**, click the box beside **Select this filter the next time this dialog is invoked**.
4 Highlight the name of the file you would like to open.
5 Select **Plain text into Script window**.
6 Click **Open**.

To open a text file in a text editing window on the Macintosh:

1 Select **File > Open**.

Figure 2.6 Opening a Text Document on the Macintosh



2 Highlight the name of the file you would like to open.

3 Click **Open**.

Importing Text as Data

Importing text as JMP data tables is quick and useful for situations where text was first pasted into a text window, and then subsequently formatted and adjusted in preparation for import into a data table.

To import text as a data table:

1 Open the script or text in JMP as a script and make sure it is the active window.

2 Select **File > Import as Data** (Windows and Linux) or **Edit > Import as Data** (Macintosh).

3 The text is imported into a JMP data table using the settings from the Text Import preferences. The Preferences window is found under **File > Preferences > Text Data Files** (on Windows and Linux) or **JMP > Preferences > Text Data Files** (on Macintosh).

Importing text as JMP data tables is also useful when extracting tabular information from a web page.

To import data from a web page:

1 Highlight the information that is on a web page and copy it to the clipboard.

2 Open a new script window in JMP by selecting **File > New > Script** (Windows and Linux) or **File > New > New Script** (Macintosh).

3 Paste the information to the script window.

4 Select **File > Import as Data** (Windows and Linux) or **Edit > Import as Data** (Macintosh).

The size limit of a file to be imported is restricted by the amount of free RAM and virtual memory that the system has. For example, JMP doesn't import a 1 GB file into a system that has a combined 500MB of RAM and virtual memory. For reasonable performance, the size of the file to import should be less than the physical RAM present in the machine.

Opening Excel and OpenOffice Files

You can open Microsoft Excel files on JMP for Windows and Macintosh. You can open OpenOffice spreadsheets on Linux:

1 Select **File > Open**.
2 On Windows: From the **Files of type** field, select **Excel Files (*.XLS)**.
On Linux: From the **Filter** field, select ***.sxc (OpenOffice Spreadsheet)**.
3 Select the file you want to open.

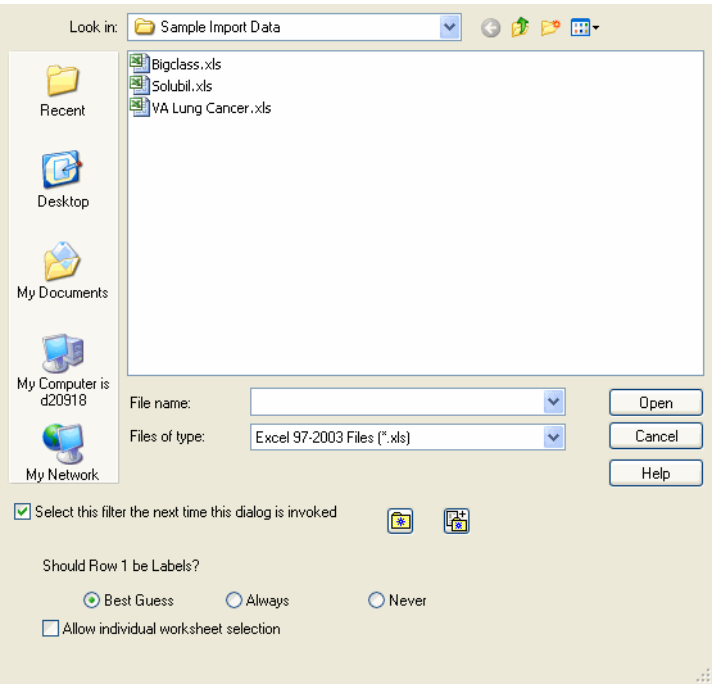
Note: On Windows, the Open Data File window contains several options that are specific to opening Excel files:

- If your file's column headings are found in row one of the Excel spreadsheet, select **Always** under **Should Row 1 be Labels?**.
- If your file contains multiple worksheets and you only want to open certain ones, select the **Allow individual worksheet selection** choice. If you want this option to be checked each time you open an Excel file, select **File > Preferences** and check **Select Individual Excel Worksheets** in the General category.

---

4 On Linux, click **Next** to see these options:
    - If your file's column headings are found in row one of the OpenOffice spreadsheet, click the box beside **First Row Column Headings**.
    - If your file contains multiple worksheets and you only want to open certain ones, check the boxes beside the sheets in the **Select Sheets to Open** area.
5 On Windows and Macintosh, click **Open**. On Linux, click **Finish**.

Figure 2.7 Opening an Excel File on Windows



Opening SAS Data Sets

SAS data sets are files that were saved in one of many SAS formats. On Windows, JMP can open files that are SAS version 6 or later. On the Macintosh and Linux, JMP can open files that are SAS version 6.

Note: Opening a SAS data set directly is different from connecting to a SAS data set through integration with a SAS Server. See "SAS Integration" chapter for details.

- On Windows, JMP uses SAS labels as JMP data table column names by default. You can override the default and request that JMP uses SAS variable names as JMP column names. See step 4 below.
- On the Macintosh, JMP uses SAS variable names as table column names by default. Once in an imported JMP data table, you can view the SAS labels by double-clicking the column name. The SAS label appears as a Notes property. You can also replace the table column names with the SAS labels by running the script JMP automatically created when it opened the data table. The script is located in the tables panel under the data table name.
- On Linux, JMP uses SAS labels as JMP data table column names by default.

To open a SAS data set:

1 Select **File > Open**.

2 On Windows, select **SAS Data Sets** or **Data Files** from the **Files of type** drop-down menu, as shown in Figure 2.8

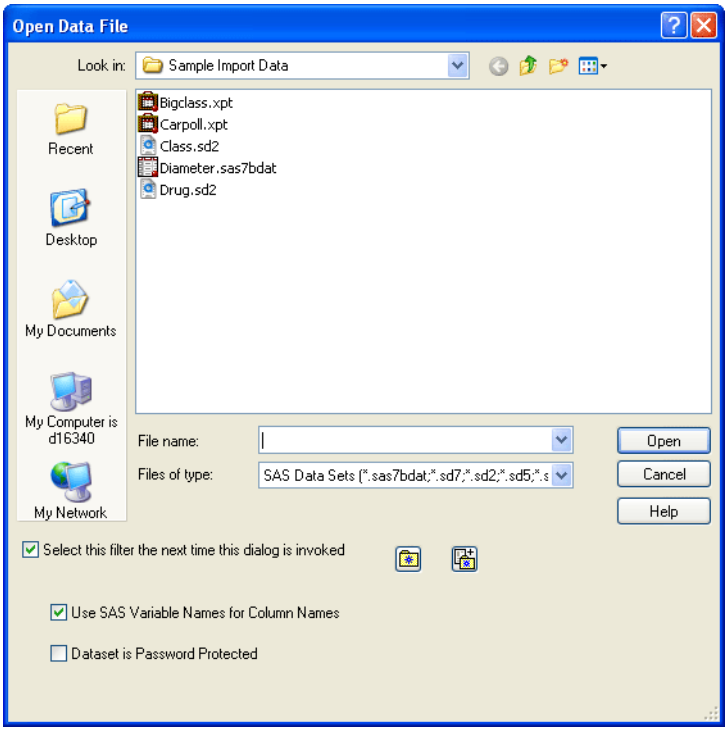
On Linux, select ***.sd2, sas7bdat (SAS Data Set)** from the **Filter** list.

Note: SAS variable names and formats are preserved and can be saved after changes are made to the SAS data set. See "SAS Variable Names and Formats," p. 112 in the "Saving Tables, Reports, and Sessions" chapter.

---

3 Highlight the file you would like to open.

Figure 2.8 Open SAS Data Set



4 (Optional and available on Windows only) Select any of the following for a SAS data set:

- **Select this filter the next time this dialog is invoked** Sets the default file type choice to the option you select in the **Files of Type** list. If clicked, the default file type will be **SAS Data Sets** the next time you reach this window.
- **Use SAS Variable Names for Column Names** Uses the SAS variable names (instead of the labels) as the column names in the JMP data table.
- **Dataset is Password Protected** Click this box if you know the file is password protected. See "Opening Password-Protected Data Sets," p. 25, for details.

5 (Optional) Select any of the following for a SAS Transport (.xpt) file:

- **Select Member** Lets you type the name of a specific member, or table, for JMP to open.
- **Open all members** Opens all members, or tables, in the transport file.
- **Save all members** Saves the file as a JMP file as soon as you open it. The file is saved to the same directory where the SAS transport file was opened.
- **Select Columns** Tells JMP to open only certain columns from the transport file. When you click **Open** (Windows) or **Finish** (Linux), JMP provides a list of columns with checks next to the columns it intends to open. Add or remove checks to modify the list.

6 Click **Open** (Windows and Macintosh) or **Finish** (Linux).

Note: If you are importing date variables from a SAS file, JMP looks for a SAS date format and translates it to a JMP date column.

Opening Password-Protected Data Sets

On Windows, JMP can open SAS version 7 or higher data sets that are password protected.

To open password-protected data sets:

1 Select **File > Open**.

2 Select **SAS Data Sets** from the **Files of type** drop-down menu.

3 Click the box beside **Dataset is Password Protected**.

4 Highlight the file you would like to open.

5 Click **Open**.

A window appears that asks you to type the password and choose the appropriate type of password (**Read**, **Alter**, or **Write**)

Creating SAS Transport Files in SAS

JMP can open SAS transport files that were saved using the SAS XPORT engine. For example, below is sample SAS code that creates a transport file called test. (**Note:** `misc` and `work` are SAS libref names.)

```
data test;
input name $ age weight;
cards;
Lee 12 72
Melanie 10 68
Jonathan 11 77
Diane 13 67
;
libname misc xport 'C:/test.xpt';
proc copy in=work out=misc;
run;
```

Opening Data from a Database

You can import data from a database if you have an ODBC (Open Database Connectivity) driver for the database.

Your operating system provides an interface for JMP to communicate with databases using ODBC data sources. Data sources can be created and configured with operating system software: For example, on Windows XP, use **Control Panel > Administrative Tools > Data Sources**; on the Macintosh, use **Applications > Utilities > ODBC Administrator**; on Linux, ODBC connectivity is provided by UNIX ODBC, so see your UNIX ODBC documentation for details.

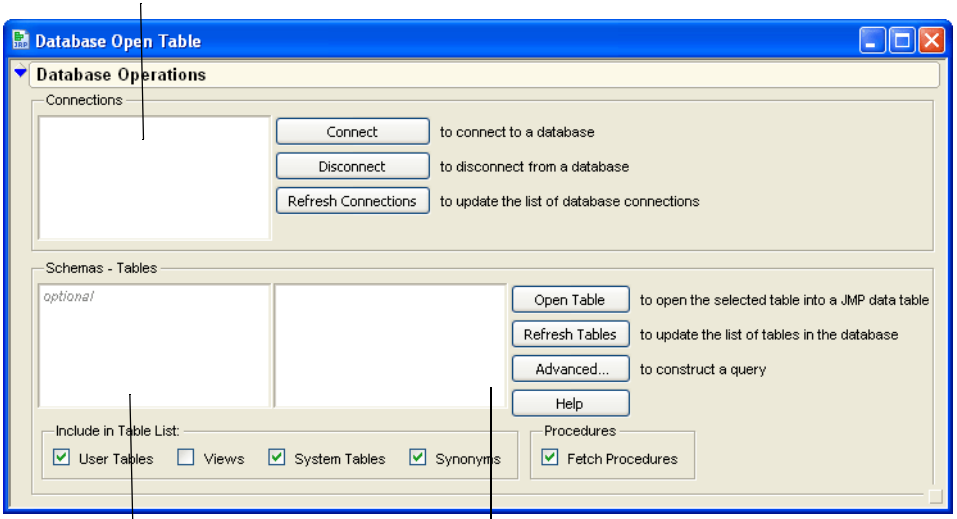
Note: When you import data from an ODBC database, a table variable is added that might contain user ID and password information. There is a JSL-only preference that can be set to prevent including this possibly sensitive information. See the *JMP Scripting Guide* for more details.

To import data from a database:

1 Select **File > Database > Open Table** to display the window shown in Figure 2.9. The Connections box lists data sources to which JMP is connected. The Schemas box lists schemas for those databases that support them. The Tables box lists database tables for the currently selected data source connection.

Figure 2.9 Initial Window Given by Database Open Command

When one or more database connections are made, the list of connections shows in the **Connections** list

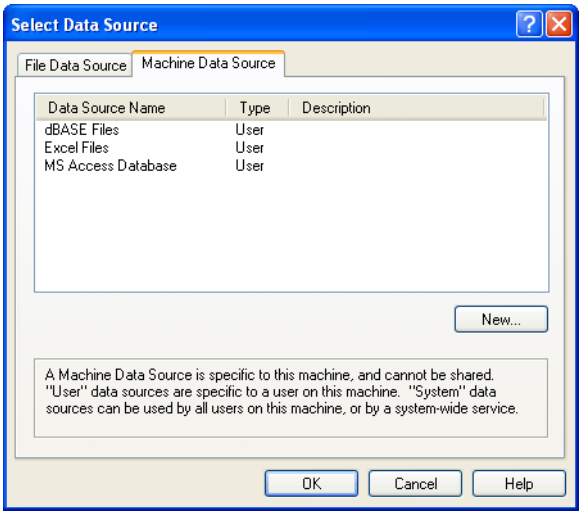


If your database supports schemas (for example, Oracle), this field shows the schema list. It disappears if you select a database that does not support schemas.

If there are tables in the selected database file or directory, they are displayed in the **Tables** list

2 If the desired data source is *not* listed in the Connections box, click **Connect** to choose a data source. The method of choosing a data source depends on your operating system. Figure 2.10 shows the data source chooser for Windows. Select a data source and click **OK**.

Figure 2.10 Select a Database Source (Windows)



3 Select the desired data source in the Connections box. The tables list in the Tables box updates accordingly. The update might take a several seconds, depending on the number of tables and the speed of the connection to the database. If your database supports schemas, tables are loaded for the first schema in the list, and on other schemas as you click on them.

4 To control which tables are listed by choosing the options in the **Include in Table List** group of check boxes. Different drivers interpret these labels differently. Your options are:

User Tables When clicked, displays all available user tables in the **Tables** list. User tables are specific to which user is logged on to the computer.

Views When clicked, displays "views" in the **Tables** list along with all other file types that can be opened. "Views" are virtual tables that are query result sets updated each time you open them. They are used to extract and combine information from one or more tables.

System Tables When clicked, displays all available system tables in the **Tables** list. System tables are tables that can be used by all users or by a system-wide service.

Synonyms When clicked, displays all available ORACLE synonyms in the **Tables** list.

5 Select the desired table from the Tables list.

Note: If you are connected to a dBase database, select the database *folder* to which you would like to connect. Individual files are grayed out and cannot be selected.

---

6 Click **Open Table** to import all the data in the selected table, or click **Advanced** to specify a subset of the table to be imported.

Note: Some databases require that you enter the user ID and password to access the data.

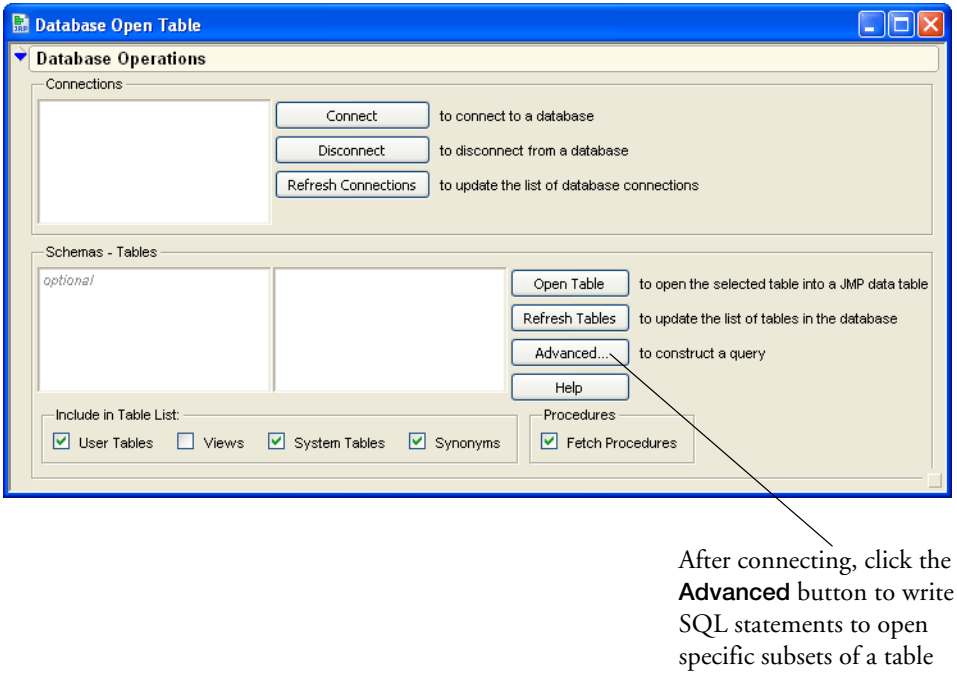
Retrieving Data Using SQL Statements

You can use Structured Query Language (SQL) statements to control what you import from a database. When you open a database file in JMP, you are actually sending an SQL statement to the database. By default, this statement gets all files and records in the database table. In some cases, this is too much data. When you are interested only in a subset of the table's data, you can customize the SQL request to only request the data you want. After you execute an SQL query, the code for the query is stored in the data table in the SQL table variable. To retrieve data using SQL statements:

1 Connect to a database by following the steps in "Opening Data from a Database," p. 26.

2 From the **Database Open Table** window, shown in Figure 2.11, click the **Advanced** button.

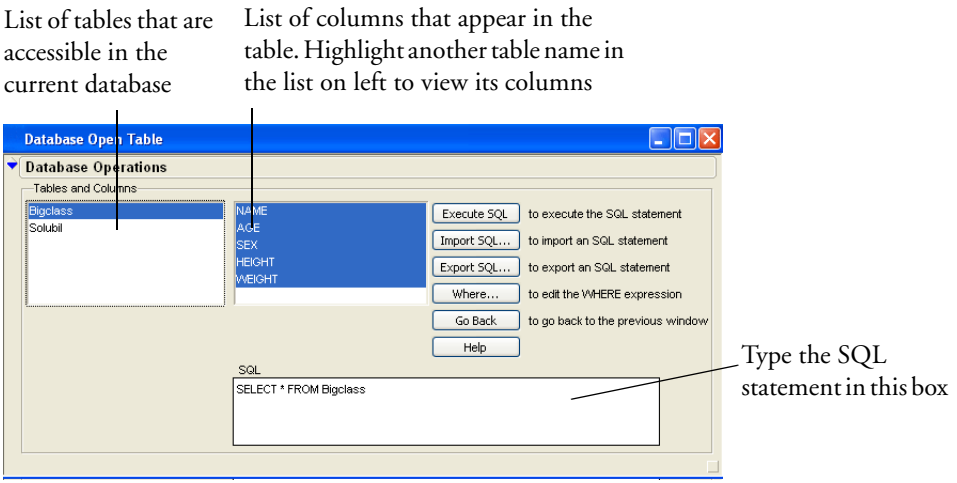
Figure 2.11 Click the Advanced Button



3 Either type in a valid SQL statement, or modify the default statement. Figure 2.12 shows a default SQL `Select` statement appropriate for the selected file. See "Structured Query Language (SQL): A Reference," p. 30, for a description of SQL statements you can use.

Alternately, you can add expressions by clicking the **Where** button and using the WHERE Clause editor to create expressions. See "Using the WHERE Clause Editor," p. 33, for details.

Figure 2.12 Reading All Variables From the Big Class Table Stored in an Excel File



4 Click **Execute SQL**. The SQL statement becomes an SQL table variable in the JMP data table. (See "Adding Table Variables," p. 84, for details.)

For example, if you want to import only the name and age of females older than 14, then the SQL shown in Figure 2.12 would be different. Instead of this statement:

```
SELECT * FROM Bigclass
```

you would write:

```
SELECT NAME, AGE FROM Bigclass where AGE>14 and SEX='F'
```

After you click **Execute SQL**, a JMP data table appears with columns Name and Age.

Note that you can enter any valid SQL statement and click **Execute SQL** to execute the command. Valid SQL varies with the data source and ODBC driver.

Structured Query Language (SQL): A Reference

The following sections are a brief introduction to SQL. They give you insight to the power of queries, and they are not meant to be a comprehensive reference.

Using the SELECT Statement

The fundamental SQL statement in JMP is the SELECT statement. It tells the database which rows to fetch from the data source. When you completed the process described in "Opening Data from a Database," p. 26, you were actually sending the following SQL statement to your data source.

```
SELECT * FROM Solubil
```

The * operator is an abbreviation for "all columns." So, this statement sends a request to the database to return all columns from the specified data table.

Rather than returning all rows, you can replace the * with specific column names from the data table. In the case of the Solubility data table example, you could select the ETH, OCT, and CCL4 columns only by submitting this statement:

```
SELECT ETH, OCT, CCL4 FROM Solubil
```

Note: JMP does not require you to end SQL statements with a semicolon.

JMP provides a graphical way of constructing simple SELECT statements without typing actual SQL. To select certain columns from a data source, highlight them in the list of columns (Figure 2.12).

To highlight several rows,

- Shift-click to select a range of column names
- Ctrl-click (Windows and Linux) or Command-click (Macintosh) to select individual column names.

Note that the SQL statement changes appropriately with your selections.

Sometimes, you are interested in fetching only unique records from the data source. That is, you want to eliminate duplicate records. To enable this, use the DISTINCT keyword.

```
SELECT DISTINCT ETH, OCT, CCL4 FROM Solubil
```

Sorting Results

You can have the results sorted by one or more fields of the database. Specify the variables to sort by using the ORDER BY command.

```
SELECT * FROM Solubil ORDER BY LABELS
```

selects all fields, with the resulting data table sorted by the LABELS variable. If you want to specify further variables to sort by, add them in a comma-separated list.

```
SELECT * FROM Solubil ORDER BY LABELS, ETH, OCT
```

Using the WHERE Statement

With the WHERE statement, you can fetch certain rows of a data table based on conditions. For example, you might want to select all rows where the column ETH has values greater than 1.

```
SELECT * FROM Solubil WHERE ETH > 1
```

The WHERE statement is placed after the FROM statement and can use any of the following logical operators.

Table 2.2 WHERE Operators

Operator	Meaning
=	Equal to
!= or < >	Not equal to
>	Greater than
<	Less Than
>=	Greater than or equal to
<=	Less than or equal to
NOT	Logical NOT
AND	Logical AND
OR	Logical OR

When evaluating conditions, NOT statements are processed for the entire statement first, followed by AND statements, and then OR statements. Therefore

```
SELECT * FROM Solubil WHERE ETH > -2 OR OCT < 1 AND CCL4 > 0
```

is equivalent to

```
SELECT * FROM Solubil WHERE ETH > -2 OR (OCT < 1 AND CCL4 > 0)
```

Using the IN and BETWEEN Statements

To specify a range of values to fetch, use the IN and BETWEEN statements in conjunction with WHERE. IN statements specify a list of values and BETWEEN lets you specify a range of values. For example,

```
SELECT * FROM Solubil  WHERE LABEL IN ('Methanol', 'Ethanol', 'Propanol')
```

fetches all rows that have values of the LABEL column Methanol, Ethanol, or Propanol.

```
SELECT * FROM Solubil WHERE ETH BETWEEN 0 AND 2
```

fetches all rows that have ETH values between 0 and 2.

Using the LIKE Statement

With the LIKE statement, you can select values similar to a given string. Use % to represent a string of characters that can take on any value. For example, you might want to select chemicals out of the Solubil data that are alcohols, that is, have the –ol ending. The following SQL statement accomplishes this task.

```
SELECT * FROM Solubil WHERE LABELS LIKE '%OL'
```

The % operator can be placed anywhere in the LIKE statement. The following example extracts all rows that have labels starting with M and ending in OL:

```
SELECT * FROM Solubil WHERE LABELS LIKE 'M%OL'
```

Using Aggregate Functions

Aggregate functions are used to fetch summaries of data rather than the data itself. Use any of the following aggregate functions in a SELECT statement.

Table 2.3 SELECT Statement Functions

Function	Meaning
SUM( )	Sum of the column
AVG( )	Average of the column
MAX( )	Maximum of the column
MIN( )	Minimum of the column
COUNT( )	Number of rows in the column

Some examples include:

- The following statement requests the sum of the ETH and OCT columns:
  `SELECT SUM(ETH), SUM(OCT) FROM Solubil`
- This statement returns the number of rows that have ETH values greater than one:
  `SELECT COUNT(*) FROM Solubil WHERE ETH > 1`
- The following statement lets you know the average OCT value for the data that are alcohols:

```
SELECT AVG(OCT) FROM Solubil WHERE LABELS LIKE '%OL'
```

Note: When using aggregate functions, the column names in the resulting JMP data table are Expr1000, Expr1001, and so on. You'll probably want to rename them after the fetch is completed.

The GROUP BY and HAVING Commands

The GROUP BY and HAVING commands are especially useful with the aggregate functions. They enable you to execute the aggregate function multiple times based on the value of a field in the data set.

For example, you might want to count the number of records in the data table that have ETH=0, ETH=1, and so on, for each value of ETH.

- SELECT COUNT(ETH) FROM Solubil GROUP BY (ETH) returns a single column of data, with each entry corresponding to one level of ETH.
- SELECT COUNT(ETH) FROM Solubil GROUP BY (ETH) WHERE OCT > 0 does the same thing as the above statement, but only for rows where OCT > 0.

When using GROUP BY with an aggregate function of a column, include the column itself in the SELECT statement. For example,

```
SELECT ETH, COUNT(ETH) FROM Solubil GROUP BY (ETH)
```

returns a column containing the levels of ETH in addition to the counts.

Using Subqueries

Aggregate functions are also useful for computing values to use in a WHERE statement. For example, you might want to fetch all values that have greater-than-average values of ETH. In other words, you want to find the average value of ETH, and then select only those records that have values greater than this average. Remember that SELECT AVG(ETH) FROM Solubil fetches the average you are interested in. So, the appropriate SQL command uses this statement in the WHERE conditional:

```
SELECT * FROM Solubil WHERE ETH > (SELECT AVG(ETH) FROM Solubil)
```

Saving and Loading SQL Queries

After constructing a query, you might want to repeat the query at a later time. You do not have to hand-type the query each time you want to use it. Instead, you can export the query to an external file. To do this, click the **Export SQL** button in the window shown in Figure 2.12. This brings up a window that lets you save your SQL query as a text file.

To load a saved query, click the **Import SQL** button in the window shown in Figure 2.12. This brings up a window that lets you navigate to your saved query. When you open the query, it is loaded into the window.

Using the WHERE Clause Editor

JMP provides help building WHERE clauses for SQL queries during ODBC import. It provides a WHERE clause editor that helps you build basic expressions using common SQL features, allowing vendor-specific functions. For example, you do not need to know whether SQL uses '=' or '==' for comparison, or avg() or average() for averaging.

In addition, string literals should be enclosed by single quotes (`'string'`)rather than double quotes (“`string`”).

To open the WHERE Clause Editor:

1 Connect to a database by following the steps in “Opening Data from a Database,” p. 26.

2 From the **Database Open Table** window, shown in Figure 2.11, click the **Advanced** button.

3 Click the **Where** button.

USE the WHERE Clause Editor to add any of the following from the work panel: expressions, functions, and terms. They are applied to the highlighted red box.

1 Click the Table Name Browser (Figure 2.13) to select a table. The columns in that table appear in the list.

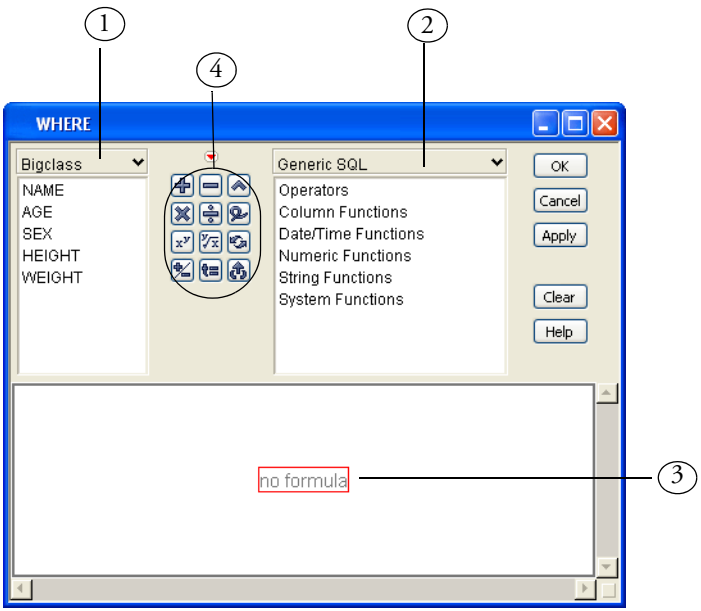
2 Click the SQL Vendor Name Browser (Figure 2.13) to select the type of SQL you want to use: GenericSQL, Access, DB2, MySQL, Oracle, SQL Server, or all of the above. Perform an action by clicking a function or operator in the list and selecting an operator from the list that appears.

3 Select an empty formula element (Figure 2.13) in the formula editing area by clicking it. It is selected when there is a red outline around it. All terms within the smallest nesting box relative to the place you clicked become selected. The subsequent actions apply to those combined elements.

4 Add operators (Figure 2.13) to an expression by clicking buttons on the keypad.

The WHERE clause editor works similarly to the formula editor, which is described in “Formula Editor,” p. 285.

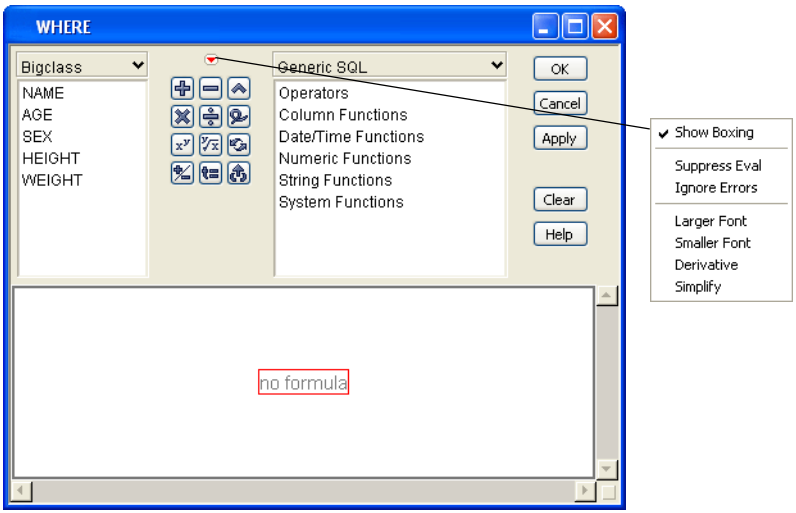
Figure 2.13 The WHERE Clause Editor



There are several ways you can customize expressions, functions, and terms in the WHERE clause editor. To change font size, show and hide boxing, change the orientation of the formula, and close arguments:

1 Build your formula.
2 Click the red triangle icon above the keypad and select the option from the menu that appears, as shown in Figure 2.14.

Figure 2.14 Select Show Boxing from the Keypad Menu Commands



Reading in Real-Time Data (Windows and Linux Only)

The term *live data feed* describes the way an external data source sends information via a physical or a logical communication link to another device. You can connect JMP to a live data feed through the serial port of your Windows or Linux computer to read a stream of incoming data in real time. Remember the following:

- The data feed must come through a standard nine-pin serial port. Data cannot be read through a USB port unless there is a driver that can simulate a serial port
- You need to know the exact baud rate, parity, stop bits, and data bits for the attached device.

Once you obtain the numbers for your device, enter them into the `Open Datafeed()` command in the script below. (The `4800`, `even`, `2`, and `7` in the script below are examples, so replace them with your information). Then connect the data feed to your computer and open and run the script:

```
streamScript = expr( line = feed <<Get Line;show(line);
              len = length(line); show(len);
  if (length(line)>=1, show("Hi"); show(line);
                    field = substr(line,5,8); show(field);
       x = Num(field); show(x);
       if (!IsMissing(x), current data table()<<add row({:Column1=x});
    show(x);
  )));
feed = open DataFeed(Baud Rate(4800),parity(even),Stop bits(2), Data
  bits(7));
feed<<Set Script(streamScript);
feed<<Connect;
```

To ensure harmony between the communications settings for JMP and the instrument reading data from an external source, select **File > Preferences > Communications**. Refer to the documentation for your instrument to find the appropriate settings.

Opening Remote Files

You can import data from Internet sites, intranet sites, servers, and FTP addresses by selecting **File > Internet Open**. You should use this command only for files that must be delivered through an Internet protocol such as HTTP or FTP, or FILE:// on Windows. To open a file from a mounted server, use **File > Open**.

If you are using a proxy server to connect to the Internet on Linux, set up your proxy settings before selecting **File > Internet Open**. See "Adjusting Proxy Settings (Linux Only)," p. 348, for details.

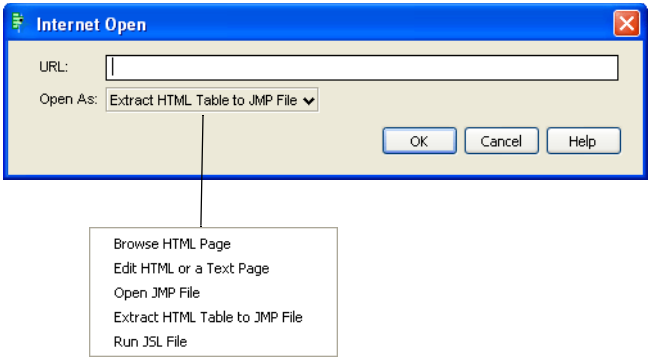
Opening a File from the Internet or an Intranet

To open or import data from a file that is on the Internet or an intranet:

1 Select **File > Internet Open**. The window in Figure 2.15 appears. (The window in Linux looks a little different from Figure 2.15. Also, on Linux, **Internet Open** does not work successfully if a firewall or secure socket is present.)

2 Type in the URL. This URL should start with `http://`, `ftp://`, or `file://`.

Figure 2.15 Internet Open Window



3 Click the drop-down menu under **Open As**, and select the option that specifies how you would like JMP to display the imported data:

Browse HTML Page Opens the web page in a browser. On Linux, you must specify the proxy setting in the *browser* (not in the JMP Preferences window) before you can use the **Browse HTML Page** option.

Edit HTML or a Text Page Opens the web page or text file in a text editor, displaying the HTML tags of a .html file.

Open JMP File Opens the web page as a data table. This option should be used only if a JMP data table (a .jmp file) resides at the web address you enter.

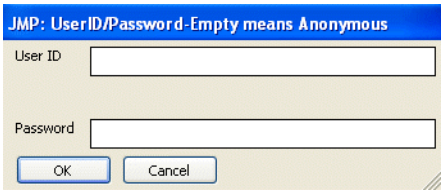
Extract HTML Table to JMP File Opens the web page in a data table. This option should be used only if an HTML table is located at the web address you enter. To create a meaningful data table, the HTML table information must consist of cells of data only. HTML tables that are created for page formatting or that include headings do not result in meaningful JMP tables.

Run JSL File Opens a JSL (JMP Scripting Language) file and runs the script.

4 Click **OK**. On Windows, the URL from which the table came is included in the data table as a note property if the table did not already contain a note.

If your URL is to an FTP server, the window in Figure 2.16 appears.

Figure 2.16 JMP: User ID/Password-Empty means Anonymous Window



For an anonymous account, click **OK**. For a typical login, enter your user ID and password.

Note: Some anonymous FTP servers require a user ID. If the data table does not open, try typing either **ftp** or **anonymous** in the **User ID** text box. Leave the **Password** text box empty and click **OK**.

Opening a File from a Server or Another Computer (Windows Only)

To import data from a file that is on a server or on another computer:

1 Select **File > Internet Open**.

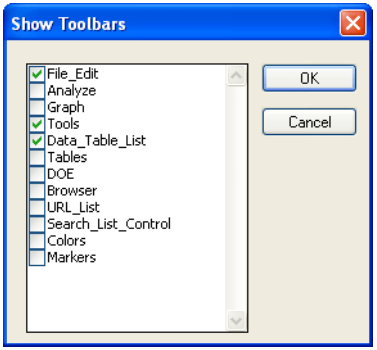
2 Type the URL in the text box, which must begin with file://

3 Click the drop-down menu under **Open As**, and select the option that specifies how you would like JMP to display the imported file

Also on Windows, you can display the Browser toolbar (containing standard browser buttons: Back, Forward, Home, Refresh, and Stop) and URL List toolbar (containing a box to enter a URL address):

1 Select **View > Show Toolbars**. The window in Figure 2.17 appears.

Figure 2.17 Show Toolbars Window



2 Click the boxes beside both **Browser** and **URL_List.**

3 Click **OK**.

The toolbars appear at the top of the JMP application.

The Browser toolbar, as shown in Figure 2.18, contains standard browser buttons: Back, Forward, Home, Refresh, and Stop.

Figure 2.18 The Browser Toolbar

The URL List toolbar, as shown in Figure 2.19, contains an edit box, which enables you to enter a URL address, press **Enter**, and access the page. It also contains a drop-down menu of all the addresses you have opened. You can select from this list and press **Enter** to bring up the page.

Figure 2.19 The URL List Toolbar

E-mailing Tables and Reports (Windows Only)

If you are using a Windows operating system, JMP gives you a one-click method of e-mailing a data table and report.

To send e-mail from JMP:

1 Open a data table or create a report.

2 Select **File > Send**. The open window is submitted to the default e-mail application as defined in your operating system. A window appears containing the forms necessary for e-mailing.

Creating Journals

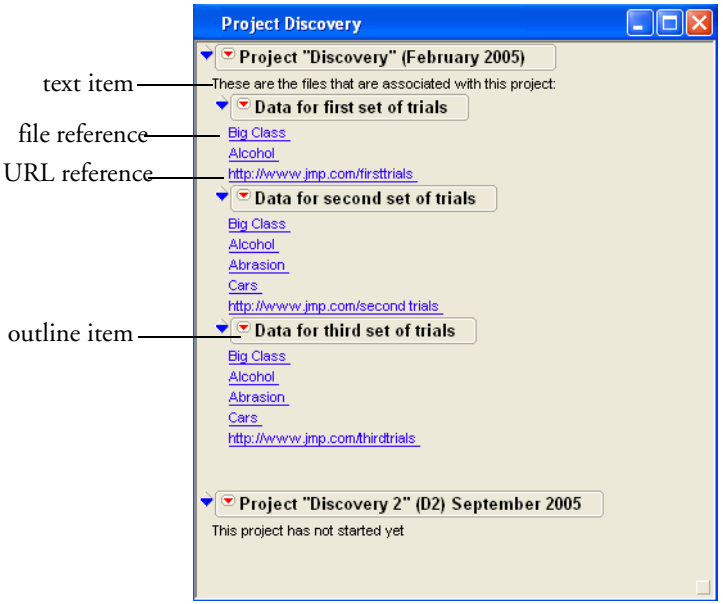
Producing an empty journal window and customizing it helps you with your JMP projects. It becomes a type of reference file: within the journal you can save text items, hyperlinks to other files, URLs, scripts, and directories of files.

You can even create and save a script that contains links to all relevant reports and data tables. The script stores the session as a .jsl file with links to tables and reports.

A journal can be thought of as an empty piece of paper. It is a customizable, flexible window to hold elements such as graphs, tables, text, links to URLs, links to data tables, and other files. It can also be thought of as a repository for all pieces of a project or task.

Figure 2.20 shows an example of how you can structure a journal for a sample project.

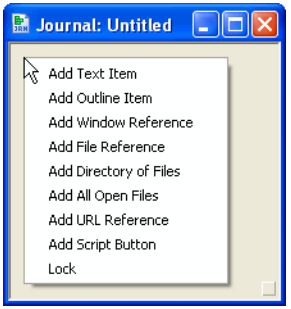
Figure 2.20 Example of Using a Journal

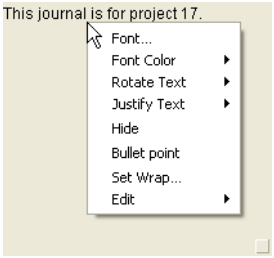


To create a new journal:

1 Select **File > New > Journal**. Or, from the JMP Starter window, select **New Journal**.

2 Add and edit journal items, as explained below.

Task	Action
Add an item to the journal	Right-click an empty space in the journal window and select an option, as shown in Figure 2.21. **Figure 2.21** Adding Items to a New Journal 
Add a journal note	Double-click an empty space in the journal window and type into the box that appears.

Task	Action
Add a graphic	Copy a graphic from within JMP or from a graphic application and paste it into the journal using **Edit > Paste**. JMP places the graphic at the end of the journal.
Edit an item	Right-click an item to edit it, as shown in Figure 2.22. **Figure 2.22** Editing a Journal 

3 Save the journal by selecting **File > Save As**. If you save the journal as a .html file, buttons and links are available when the file is viewed in a web browser.

You can edit the journal to improve it in a number of ways:

- To click and drag journal items to different positions, select the selection (large plus) cursor icon. As you drag items, JMP highlights the destination seams to indicate where items can be inserted.
- To adjust text wrapping, right-click a text box and select **Set Wrap** from the menu that appears. Enter the number of desired pixels per line.
- When adding links to other files, consider changing absolute file paths to relative file paths, which start relative to where the journal file is stored. If you move the location of the journal, the links continue to work because the referenced files are in the same place relative to the journal file.
- When adding links to files in the Sample Data folder that was installed when you installed JMP, use the pathname $SAMPLE_DATA/xx where *xx* is the relative path from the Sample Data directory.
- See "Customizing JMP Journals," p. 118, for more ways to edit journals.

Example: Making a Journal for a Presentation

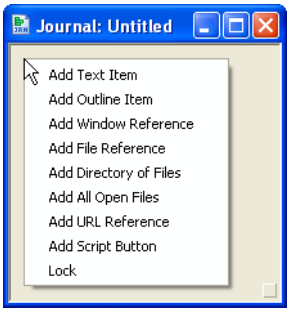
Most people use a presentation application like PowerPoint to visually aid a presentation. With JMP journals, it is possible to avoid using a presentation application, since all your bullet points can be combined with live links and buttons to help automate the analyses you want to show.

Follow along with this example to create a sample presentation using a journal

1 Select **File > New > Journal**.

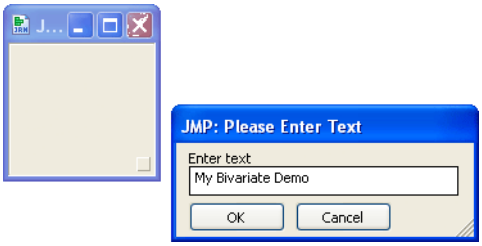
2 Right-click in the journal. Start your outline by selecting **Add Outline Item**.

Figure 2.23 Right-click in the Journal



3 Enter the title of the presentation.

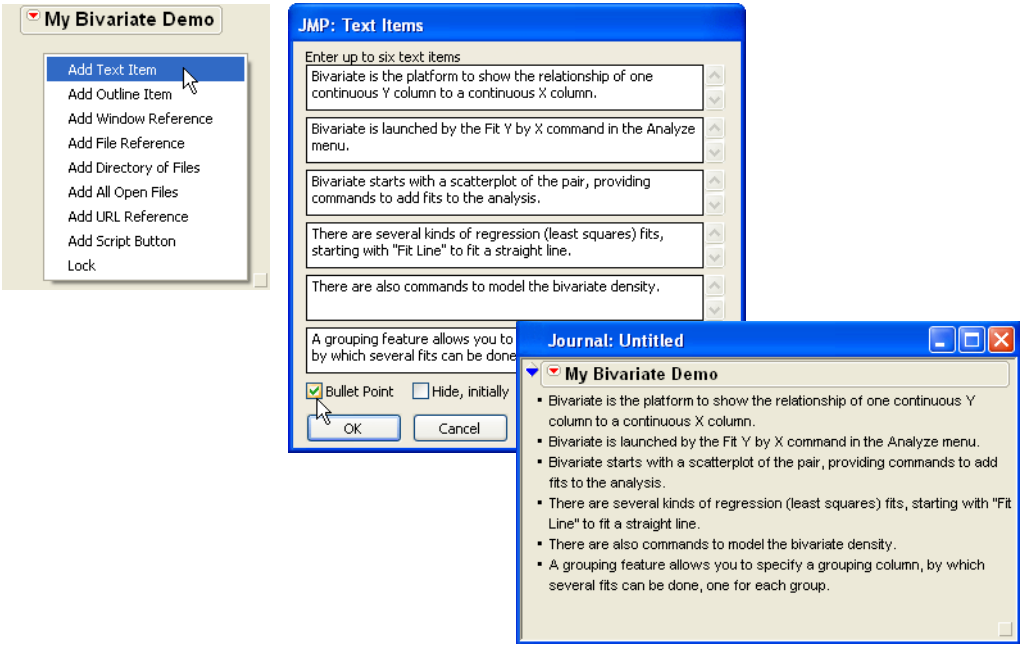
Figure 2.24 Enter the Title



A presentation should have outline nodes, which are nested, opened, and closed in sequence, as you give the presentation.

4 Add bullet points into the outline by clicking the red triangle in the My Bivariate Demo title bar and selecting **Add Text Item**.

Figure 2.25 Add Text Items


My Bivariate Demo
Add Text Item
Add Outline Item
Add Window Reference
Add File Reference
Add Directory of Files
Add All Open Files
Add URL Reference
Add Script Button
Lock
JMP: Text Items
Enter up to six text items
Bivariate is the platform to show the relationship of one continuous Y column to a continuous X column.
Bivariate is launched by the Fit Y by X command in the Analyze menu.
Bivariate starts with a scatterplot of the pair, providing commands to add fits to the analysis.
There are several kinds of regression (least squares) fits, starting with "Fit Line" to fit a straight line.
There are also commands to model the bivariate density.
A grouping feature allows you to
by which several fits can be done
Bullet Point
Hide, initially
OK
Cancel
Journal: Untitled
My Bivariate Demo
Bivariate is the platform to show the relationship of one continuous Y column to a continuous X column.
Bivariate is launched by the Fit Y by X command in the Analyze menu.
Bivariate starts with a scatterplot of the pair, providing commands to add fits to the analysis.
There are several kinds of regression (least squares) fits, starting with "Fit Line" to fit a straight line.
There are also commands to model the bivariate density.
A grouping feature allows you to specify a grouping column, by which several fits can be done, one for each group.

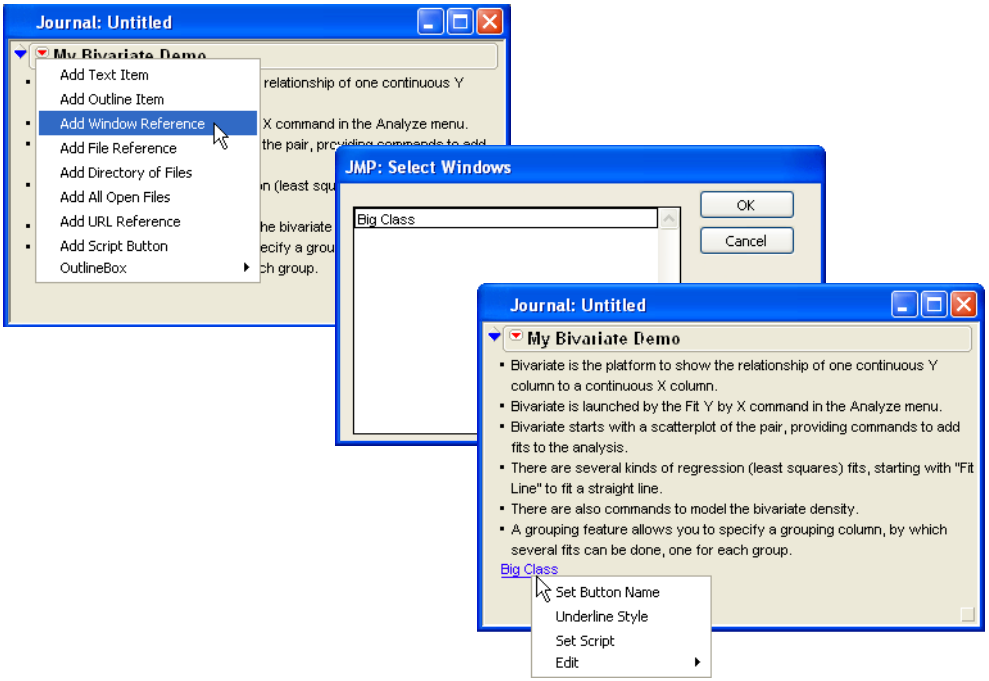
Now add file references as links. These enable you to open a file with one click during the presentation.

5 Click the red triangle in the My Bivariate Demo title bar and select **Add Window Reference**. Or, right-click the blue disclosure icon to access the same menu. Note that you must have other data table or report windows open before selecting **Add Window Reference**.

6 Select an open window and click **OK**.

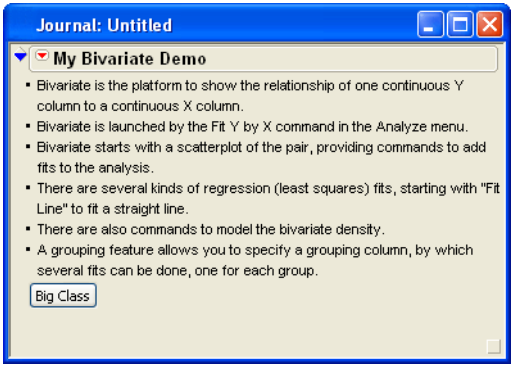
7 Verify that clicking the link opens the file by right-clicking it and selecting **Set Script** to view the path to the file (Figure 2.26).

Figure 2.26 Add References


Journal: Untitled
My Bivariate Demo
Add Text Item
Add Outline Item
Add Window Reference
Add File Reference
Add Directory of Files
Add All Open Files
Add URL Reference
Add Script Button
OutlineBox
JMP: Select Windows
Big Class
OK
Cancel
Journal: Untitled
My Bivariate Demo
Bivariate is the platform to show the relationship of one continuous Y column to a continuous X column.
Bivariate is launched by the Fit Y by X command in the Analyze menu.
Bivariate starts with a scatterplot of the pair, providing commands to add fits to the analysis.
There are several kinds of regression (least squares) fits, starting with "Fit Line" to fit a straight line.
There are also commands to model the bivariate density.
A grouping feature allows you to specify a grouping column, by which several fits can be done, one for each group.
Big Class
Set Button Name
Underline Style
Set Script
Edit

8 Change the appearance of the link so it is displayed as a button rather than hypertext by selecting **Underline Style** from the menu. The result should look like that in Figure 2.27.

Figure 2.27 Changing the Link to a Button


Journal: Untitled
My Bivariate Demo
Bivariate is the platform to show the relationship of one continuous Y column to a continuous X column.
Bivariate is launched by the Fit Y by X command in the Analyze menu.
Bivariate starts with a scatterplot of the pair, providing commands to add fits to the analysis.
There are several kinds of regression (least squares) fits, starting with "Fit Line" to fit a straight line.
There are also commands to model the bivariate density.
A grouping feature allows you to specify a grouping column, by which several fits can be done, one for each group.
Big Class

Note: Another way to create a button is to click the red triangle menu on the My Bivariate Demo title bar, select **Add File Reference** command and navigate to the file.

Encrypting and Decrypting Scripts

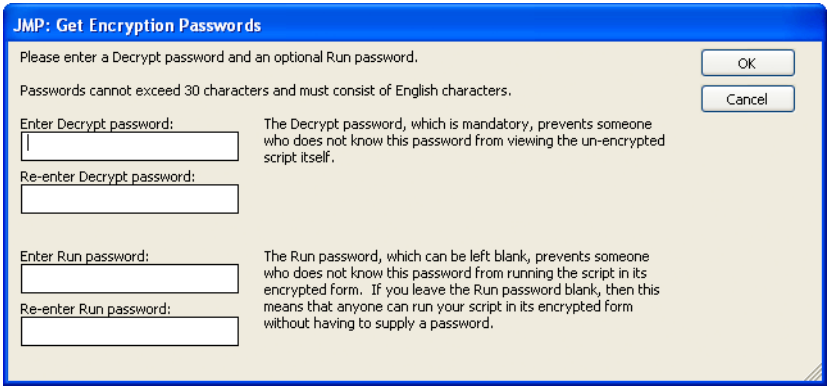
If you want to protect a JMP Scripting Language (JSL) file, you can encrypt it so only someone who knows the password can view it; you can also require a password to run it. This is useful in situations when you want to implement controlled sharing of a script.

To encrypt a script:

1 Open the script you want to encrypt.

2 Select **Edit** > **Encrypt Script**. The window shown in Figure 2.28 appears.

Figure 2.28 The Script Encryption Window


JMP: Get Encryption Passwords
Please enter a Decrypt password and an optional Run password.
Passwords cannot exceed 30 characters and must consist of English characters.
OK
Cancel
Enter Decrypt password:
Re-enter Decrypt password:
The Decrypt password, which is mandatory, prevents someone who does not know this password from viewing the un-encrypted script itself.
Enter Run password:
Re-enter Run password:
The Run password, which can be left blank, prevents someone who does not know this password from running the script in its encrypted form. If you leave the Run password blank, then this means that anyone can run your script in its encrypted form without having to supply a password.

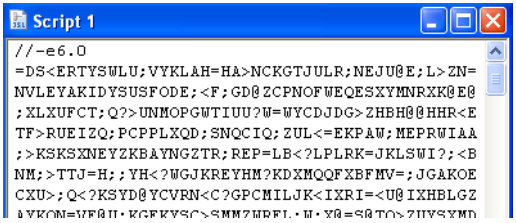
3 Assign password(s) to encrypt the files:

- To encrypt a script so that a user can run it without a password, but needs a password to view it, supply JMP with only a decrypt password.
- To encrypt a script so that a user must enter one password to run it and another password to view it, supply JMP with both a run and a decrypt password.

Note: The password must consist of single-byte characters; using a text Input Method Editor (IME) does not work.

The encrypted script appears in a new window, as shown in Figure 2.29.

Figure 2.29 Example of Encrypted Script



4 Save the encrypted script.

To view an encrypted JSL script:

1 Open the script in JMP.

2 Select **Edit > Decrypt Script**. The window in Figure 2.30 appears.

Figure 2.30 Decrypting a Script

3 Enter the decrypt password to see the script in a new window.

To run an encrypted JSL script:

1 Open the script in JMP.

2 Select **Edit > Run Script**. The window in Figure 2.31 appears.

Figure 2.31 Running an Encrypted Script

3 Enter the run password to run the script.

Note that entering the run password runs the script, but does not show the script: you must supply the decrypt password to actually view the script.

Chapter 3

Entering, Editing, and Managing Data

Preparing for Analyses

After you import data into JMP or create a new data table, you need to format your data and the table so it will be ready for analysis.

This chapter contains information that helps you:

- Understand parts of a JMP data table
- Specify data types and modeling types
- Select your data's format
- Edit data tables
- Lock data tables
- Select rows and columns

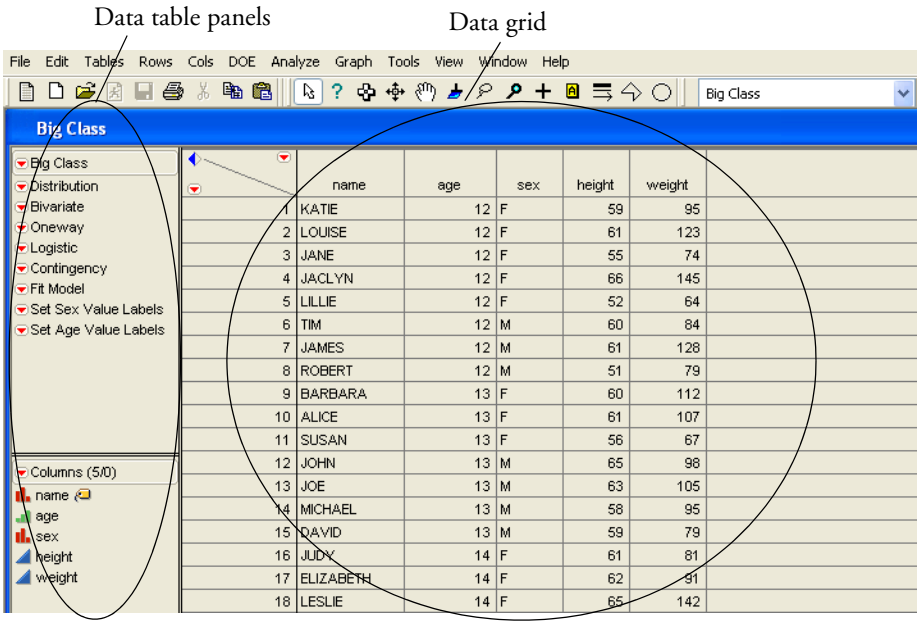
Contents

Elements of JMP Data Tables 49
Specifying Data Types and Modeling Types 58
About Data Types 58
About Modeling Types 59
How to Assign Data and Modeling Types 59
Choosing Numeric Formats 61
Entering Data 66
Adding and Deleting Rows 66
Adding and Deleting Columns 67
Setting Up Initial Data Values 69
Filling Columns with Sequential Data 70
Entering Cell Formulas 71
Editing Data and Tables 72
Editing Cells 72
Editing Column Names 72
Recoding Data 72
Viewing Patterns of Missing Data 73
Finding and Replacing Cell Values 74
Reordering Columns 77
Rows and Columns Context Menus 78
Copying, Cutting, and Pasting 79
Using the Row Editor 81
Changing Table Names 83
Locking Tables 83
Adding Table Variables 84
Creating Scripts 87
Selecting Rows and Columns 90
Selecting Excluded, Hidden, or Labeled Rows 91
Selecting Cells with Specific Values 92
Selecting a Particular Row or Column 94
Randomly Selecting Rows 95
Inversely Selecting and Selecting All Rows 96
Locating Next and Previously Selected Rows 96
The Data Filter 97

Elements of JMP Data Tables

JMP data are organized into rows and columns referred to as the *data table*. A data table has two parts, as shown in Figure 3.1: the *data table panels* and the *data grid*.

Figure 3.1 Parts of a Data Table


Data table panels
Data grid
File Edit Tables Rows Cols DOE Analyze Graph Tools View Window Help
Big Class
Big Class
Big Class
Distribution
Bivariate
Oneway
Logistic
Contingency
Fit Model
Set Sex Value Labels
Set Age Value Labels
Columns (5/0)
name
age
sex
height
weight
name age sex height weight
1 KATIE 12 F 59 95
2 LOUISE 12 F 61 123
3 JANE 12 F 55 74
4 JACLYN 12 F 66 145
5 LILLIE 12 F 52 64
6 TIM 12 M 60 84
7 JAMES 12 M 61 128
8 ROBERT 12 M 51 79
9 BARBARA 13 F 60 112
10 ALICE 13 F 61 107
11 SUSAN 13 F 56 67
12 JOHN 13 M 65 98
13 JOE 13 M 63 105
14 MICHAEL 13 M 58 95
15 DAVID 13 M 59 79
16 JUDY 14 F 61 81
17 ELIZABETH 14 F 62 91
18 LESLIE 14 F 65 142

The data table has the following characteristics:

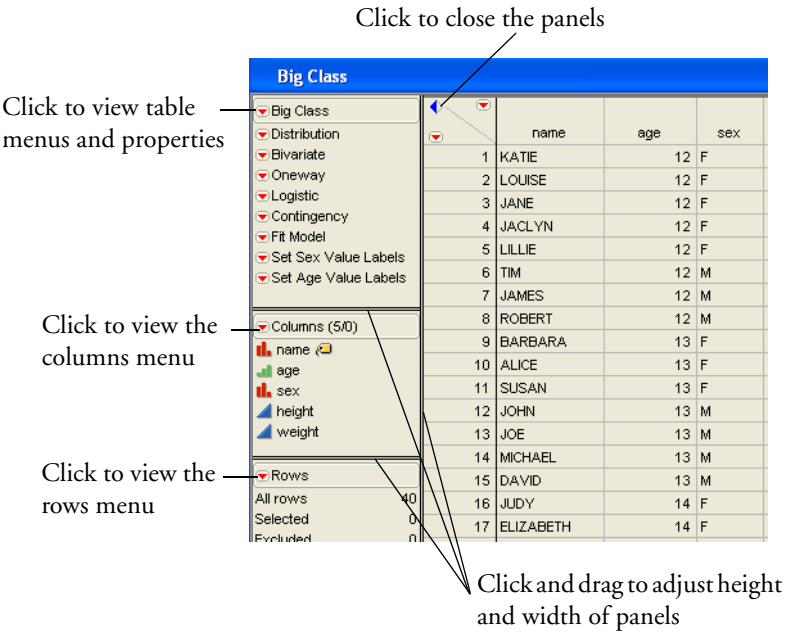
- Column names can contain any keyboard character, including spaces, and can be up to 255 characters long.
- The maximum length of the data table's name depends on your computer's operating system.
- Change the default size and font for names and values selecting **File > Preferences > Fonts**. (On the Macintosh, select **JMP > Preferences > Fonts**.)
- Column names automatically wrap in the column name area to accommodate the column width you specify.
- Move column boundaries and enlarge the column to view long values. Adjust widths of all selected columns at once by pressing the Alt key (Option key on the Macintosh and Shift-Alt on Linux) as you drag the double arrow cursor on any of the selected column boundaries.
- There is no limit to the number of rows or columns in a data table. However, the table must fit in your computer's memory.

The Data Table Panels

There are three data table panels—the table panel, the columns panel, and the rows panel. The data table panels are arranged to the left of the data grid, as shown in Figure 3.2. These panels contain

information about the table and its contents. Each have interactive components, as shown in Figure 3.2.

Figure 3.2 Interacting with Data Table Panels

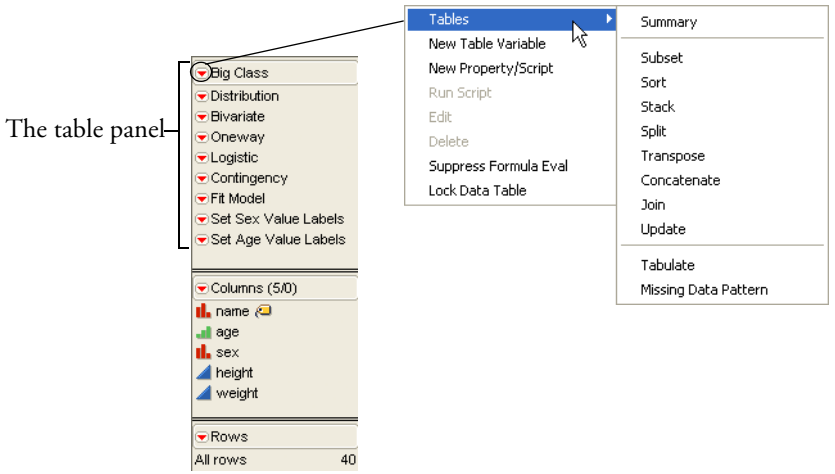


The Table Panel

The table panel contains the data table name, a small red triangle icon, and a list of any table properties/scripts. In Figure 3.3, the table variables are scripts named Distribution, Bivariate, Oneway, and so on.

To access table commands, click the red triangle icon to the left of the data table name, as shown in Figure 3.3.

Figure 3.3 The Table Panel



Clicking the red triangle icon in the table panel gives you these options:

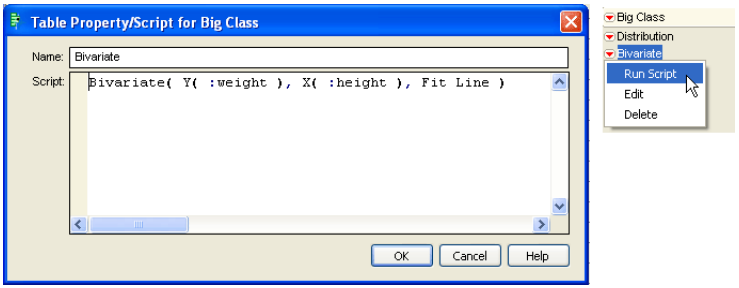
Tables Gives you the same options as selecting the **Tables** command from the main menu, which is discussed in detail in "Reshaping Data," p. 221.

New Table Variable Lets you create a new table variable, which can be text or any other constant character value that you always want to be available in the data table. Table variables are mostly used to document tables. You can also access them when you are using the formula editor so they can be incorporated into formulas or JSL scripts. JMP sometimes automatically creates table variables, such as:

- If you open a data table created by an earlier release of JMP and the table has table notes in it, a table variable called **Notes** appears with the note's text. (See "Adding Table Variables," p. 84, for an example.)
- If you create a design table with the Design of Experiments (DOE) commands, JMP creates a table variable named **Design** with the name of the design type as its value.

New Property/Script Lets you create a JSL script (a table property) to save with the data table. You can also access properties or scripts when you are using the formula editor so they can be incorporated into formulas that calculate column values. (See "Creating a Formula," p. 287, for details.) After selecting this command, name the script and type in the value (the JSL commands), as shown on the left in Figure 3.4. After you click **OK**, the new script is listed in the table panel and you can click its red triangle icon to run, edit, or delete it, as shown on the right in Figure 3.4. See "Creating Scripts," p. 87, for details.

Figure 3.4 Create a New Script



Run Script Lets you run the highlighted script (if available) that is listed under the data table name. If no script is highlighted, the **Run Script** option is not available.

Edit Lets you edit the highlighted script (if available) that is listed under the data table name. If no script is highlighted, the **Edit** option is not available.

Delete Lets you delete the highlighted script (if available) that is listed under the data table name. If no script is highlighted, the **Delete** option is not available.

Suppress Formula Eval Turns off the feature that automatically evaluates formulas. You can turn off evaluation and build sections of a formula, and then turn evaluation on to test the formula.

Lock Data Table Locks the data table so values cannot be edited or added. You will still be able to run analyses, assign characteristics, add rows and columns, and so on. See "Locking Tables," p. 83, for details.

In addition to clicking the table panel's icon and selecting from the menu, there are other actions you can take, as illustrated in Figure 3.5.

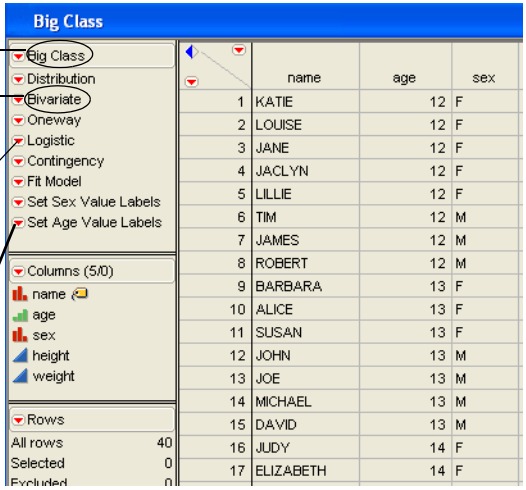
Figure 3.5 Actions That Can be Performed on the Table Panel

Click the data table name to edit it

Double-click the table variable or property name to edit the variable's name and content

Click the red triangle icon to access options available to the table variable, including running a script, if the variable is a script

Click and drag any table variable to rearrange them.



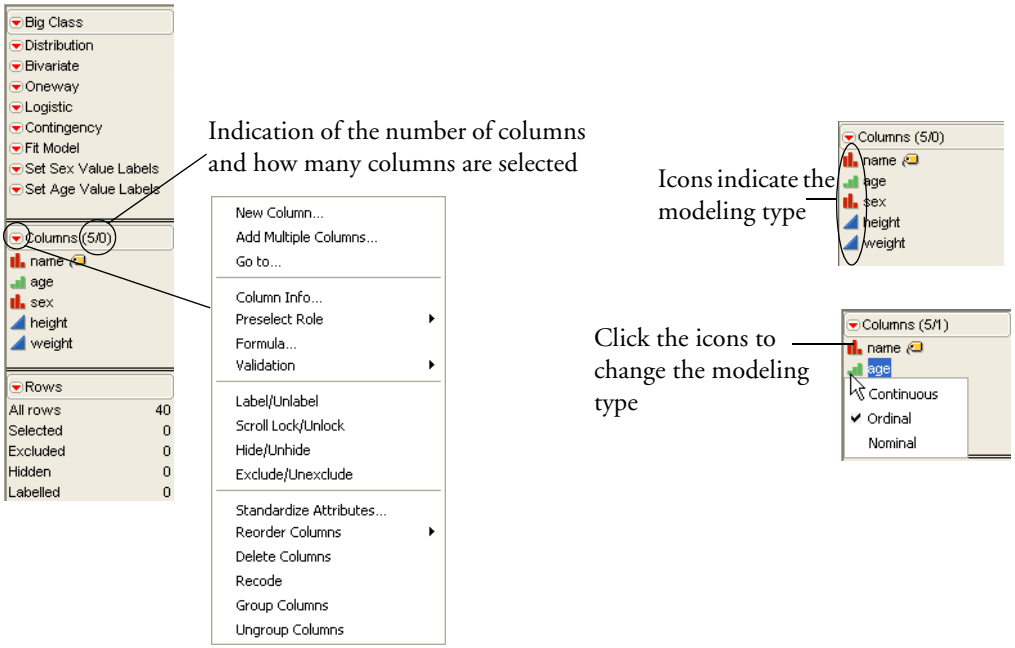
The Columns Panel

The columns panel (Figure 3.6) contains a list of columns found in the data table, each column's modeling type, and any attributes assigned to the columns.

To access column commands, click the small red triangular icon to the left of the word **Columns**, as shown in Figure 3.6. These commands give you the same options as selecting the **Cols** command from the main menu, which is discussed in "The Cols Menu," p. 430.

Icons to the left of each column name indicate the column's modeling type: continuous, ordinal, or nominal, as shown in Figure 3.6. Modeling types tell JMP how to use the column values in an analysis. To change the modeling type, click the icon and select a different type. See "About Modeling Types," p. 59, for details.

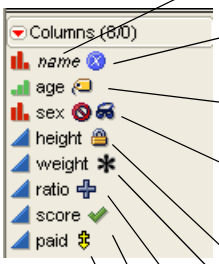
Figure 3.6 The Columns Panel



Icons to the right of each column name, as shown in Figure 3.7, indicate characteristics and properties the columns contain. See "Assigning Characteristics to Rows and Columns," p. 131 and "Assigning Properties to Columns," p. 140, for details. To change the name of a column, double-click its name in the column panel and begin typing. Or, highlight the entire column in the data grid and begin typing.

When you select columns in the Columns Panel the **Edit > Copy** command copies the names of the columns. The same command in the data grid copies the data in the selected columns and rows.

Figure 3.7 Elements Indicating Column Characteristics and Properties



Italics indicates that the column is locked into the first column of the table. When you scroll horizontally, the column remains visible.

X, Y, W, or F indicates the column has been assigned a preselected role so, in analyses, it will always appear as the *x*, *y*, weight, or frequency role.

Yellow tag indicates that points on plots corresponding to the column will be identified by the value instead of the row number.

Mask indicates that the column is hidden in the data grid.
Circle with a strikethrough indicates that the column will be excluded from any analyses you run.

Lock indicates that the column has been locked and cannot be edited.

Asterisk indicates that the column contains one or more properties. Click to reveal a list of properties the column contains.

A plus sign indicates that the values in the column result from a formula. When formula evaluation is suppressed, part of the icon becomes gray. (See "Using Formula Editor Options," p. 311, for details.) Double-click to view and edit the formula.

Range check icon indicates that the column can contain only values within a range of numbers. Click to view and edit the range.

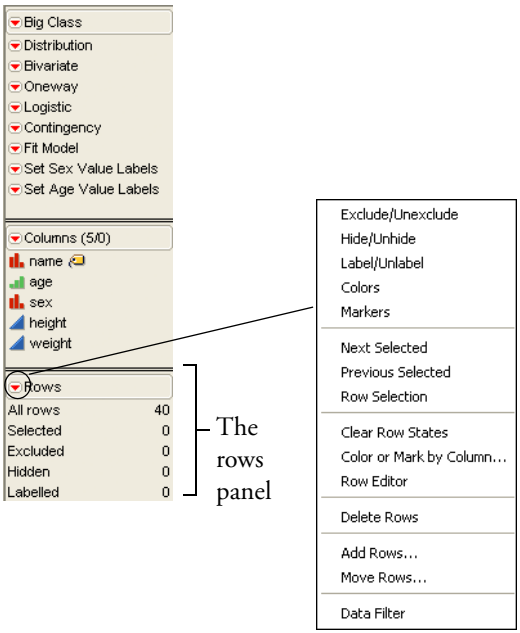
List check icon indicates that the column can contain only individual values. Click to view and edit the list.

The Rows Panel

The rows panel (Figure 3.8) shows the number of total rows, selected (or highlighted) rows, excluded rows, hidden rows, and labeled rows.

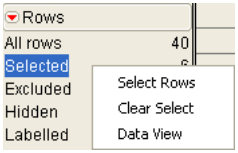
To access row commands, click the small red triangular icon to the left of the word **Rows**, as shown in Figure 3.8. These commands give you the same options as selecting the **Rows** command from the main menu, which is discussed in "The Rows Menu," p. 428.

Figure 3.8 Rows Panel



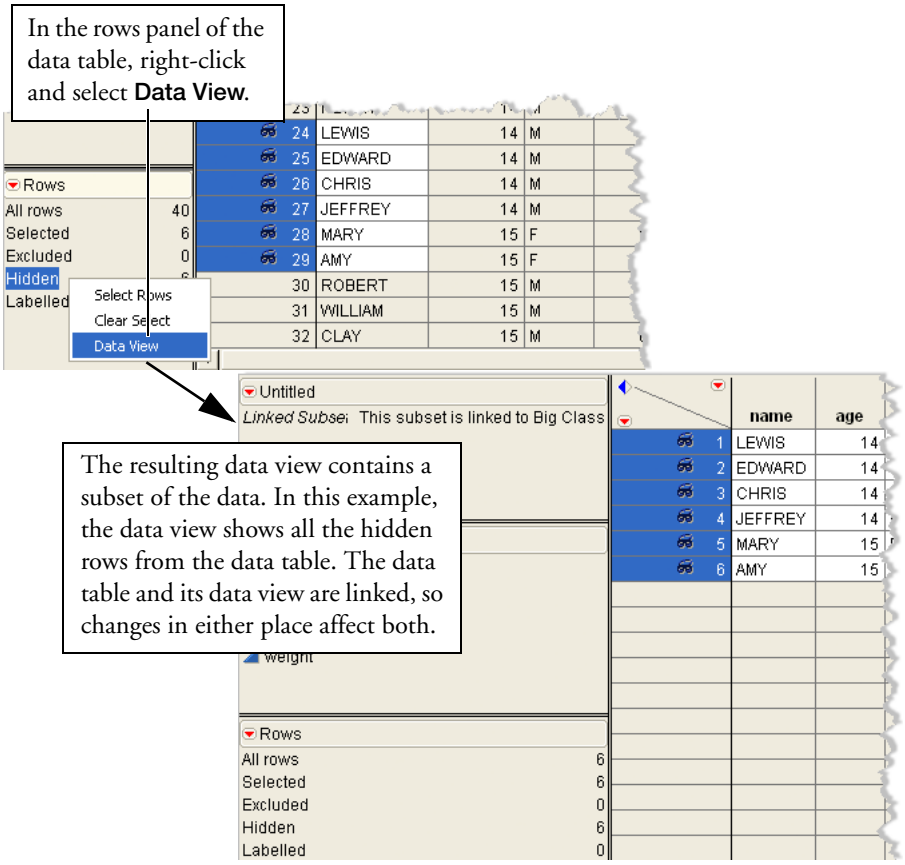
You can also right-click the categories in the rows panel (**All rows**, **Selected**, **Excluded**, **Hidden**, or **Labeled**) to select those rows, to clear the selection, or to create a *data view*.

Figure 3.9 Choices Available by Right-Clicking in Rows Panel



Creating a data view provides a convenient way to see a linked subset of the main data table. For example, if several rows are hidden but you want to open a window that shows you only the hidden rows, right-click **Hidden** in the rows panel and select **Data View**.

Figure 3.10 Creating a Data View from the Rows Panel

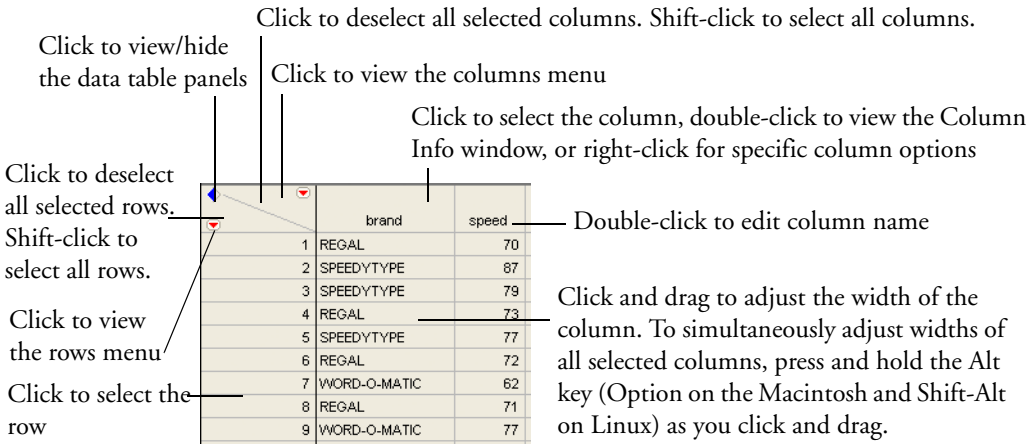

In the rows panel of the data table, right-click and select **Data View**.
Rows
All rows 40
Selected 6
Excluded 0
Hidden
Labelled
Select Rows
Clear Select
Data View
24 LEWIS 14 M
25 EDWARD 14 M
26 CHRIS 14 M
27 JEFFREY 14 M
28 MARY 15 F
29 AMY 15 F
30 ROBERT 15 M
31 WILLIAM 15 M
32 CLAY 15 M
Untitled
Linked Subset This subset is linked to Big Class
name age
1 LEWIS 14
2 EDWARD 14
3 CHRIS 14
4 JEFFREY 14
5 MARY 15
6 AMY 15
The resulting data view contains a subset of the data. In this example, the data view shows all the hidden rows from the data table. The data table and its data view are linked, so changes in either place affect both.
Rows
All rows 6
Selected 6
Excluded 0
Hidden 6
Labelled 0

You should continue to do most of your editing in the main data table. When you make changes in either the main data table or in the data view, the changes are reflected in both. You can make minor changes (such as changing some data or adding a column) in the data view. If you want to make major changes (like adding a formula) you must make those changes in the main data table.

The Data Grid

Figure 3.11 illustrates how to select rows and columns, find rows, and use keyboard arrows. See "Selecting Rows and Columns," p. 90, for details about making selections.

Figure 3.11 The Data Grid


Click to deselect all selected columns. Shift-click to select all columns.
Click to view/hide the data table panels
Click to view the columns menu
Click to select the column, double-click to view the Column Info window, or right-click for specific column options
Click to deselect all selected rows. Shift-click to select all rows.
Double-click to edit column name
Click to view the rows menu
Click and drag to adjust the width of the column. To simultaneously adjust widths of all selected columns, press and hold the Alt key (Option on the Macintosh and Shift-Alt on Linux) as you click and drag.
Click to select the row
brand
speed
1 REGAL 70
2 SPEEDYTYPE 87
3 SPEEDYTYPE 79
4 REGAL 73
5 SPEEDYTYPE 77
6 REGAL 72
7 WORD-O-MATIC 62
8 REGAL 71
9 WORD-O-MATIC 77

Cursor Forms

The cursor has different forms, and the actions it performs depend on its location in the data grid. See "The Tools Menu," p. 444, for details about cursor forms.

Arrow Cursor The cursor is the standard arrow when it is in the panels area to the left of the data table, in the triangular rows and columns area in the upper left corner of the data grid, or on the title bar of the tables panel.

- To select a column using the arrow cursor, click its name in the columns panel.
- Click the table name on the title bar of the tables panel to edit it.
- Double-click a column name in the column panel to edit it.
- Click the triangular areas in the upper left corner of the data grid to deselect rows and columns.
- Click and drag to draw a temporary line. When you release, the line disappears.

Selection (Large Plus) Cursor When the cursor is within a column heading or a row number area, it becomes a large plus, indicating it is available to select rows or columns. When you click, that row or column is highlighted. Click and drag to highlight multiple rows or columns, and Ctrl-click (Command-click on the Macintosh) to select discontiguous rows or columns.

- Double-click a column heading area to see the Column Info window for that column.
- Select a column to change the column name. The column highlights. Begin typing (if it is not in a locked column or locked data table).
- Double-click the row number area to edit the rows using the row editor.

Standard I-beam Cursor When you select editable text, the cursor becomes a standard I-beam. To edit text, position the I-beam within highlighted text. Click to mark an insertion

point, or drag to select text for replacement. The I-beam deposits a blinking vertical bar to indicate a text insertion point or a highlighted area of text to be replaced.

Double Arrow Cursor ↔ The cursor changes to a double arrow when it is on a column boundary. Drag this cursor left or right to change the width of a column. Changing the width of a column does not affect the column field width specified in the Column Info window (accessed by double-clicking a column name).

Note: You can adjust widths of all selected columns at once by pressing the Alt key (Option key on the Macintosh and Shift-Alt on Linux) as you drag the double arrow cursor on any of the selected column boundaries.

List Check and Range Check Cursors The cursor changes form when you move the mouse over values in columns that have data validation in effect. It becomes a small, downward-pointing arrow on a column with list checking, and a large I-beam on a column with range checking. When you click, the value is highlighted and the cursor becomes the standard I-beam; you enter or edit data as usual with any values defined as valid text or valid numbers. List check and range check values can be found by right-clicking the column name and selecting **Validation**, and then selecting either **List Check** or **Range Check**. See "Validating Column Data," p. 144, for details.

Popup Pointer Cursor The cursor changes to a pointer over any red triangle icon or diamond-shaped disclosure button (on Windows/Linux and ▶▼ on the Macintosh). Click to select a menu item or to open or close a panel.

Specifying Data Types and Modeling Types

A column in a JMP table can contain different types of information. However, all information in a single column must be of the same data and modeling types.

- When you import data into JMP, it guesses which data and modeling types to use. Therefore, you should check to make sure JMP guessed correctly.
- When you manually insert data into JMP, you should assign a data type and a modeling type as you insert the data.

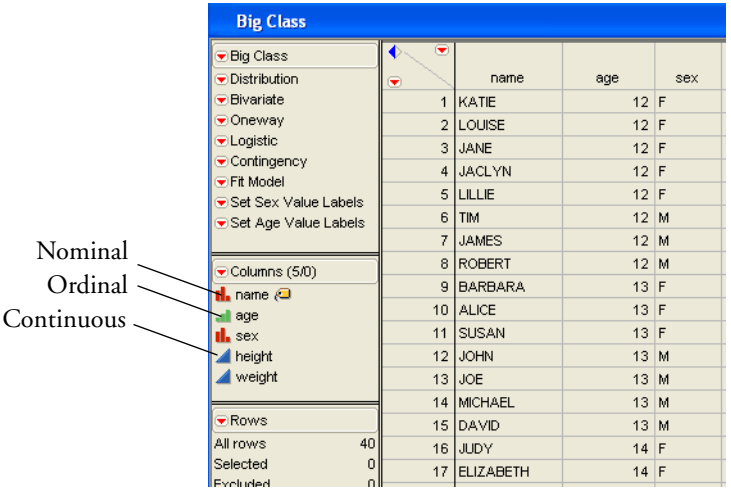
About Data Types

The data type of a column determines how its values are formatted in the data grid, how they are stored internally, and whether they can be used in calculations. The three data types are:

- **Numeric** Columns only contain numbers, with or without a decimal point.
- **Character** Columns contain any characters, including numbers. In character columns, numbers are seen as characters only and are treated as discrete values instead of continuous values. The maximum field width for character values is 32,766 bytes.
- **Row State** Columns contain row state information—information that tells you if the rows are excluded, hidden, labeled, colored, or marked. See "Using Row State Columns," p. 165, for details.

About Modeling Types

The modeling type of a column applies only to columns whose data types are numeric or character. The modeling type tells JMP how to treat its values during analyses. Changing the modeling type lets you look at a variable in different ways in an analysis. The three modeling types are:



Continuous Columns only contain numeric data types. Continuous values are treated as continuous measurement values. JMP uses the numeric values directly in computations.

Ordinal Columns contain either numeric or character data types. JMP analyses treat ordinal values as discrete categorical values that have an order. If the values are numbers, the order is the numeric magnitude. If the values are character, the order is the sorting sequence.

Nominal Columns contain either numeric or character data types. All values are treated in JMP analyses as if they are discrete values with no implicit order.

Possible combinations of data and modeling types are listed in Table 3.1.

Table 3.1 Combinations of Data and Modeling Types

		Data Type	
		Numeric	Character
Modeling Type	Continuous	yes	no
	Ordinal	yes	yes
	Nominal	yes	yes

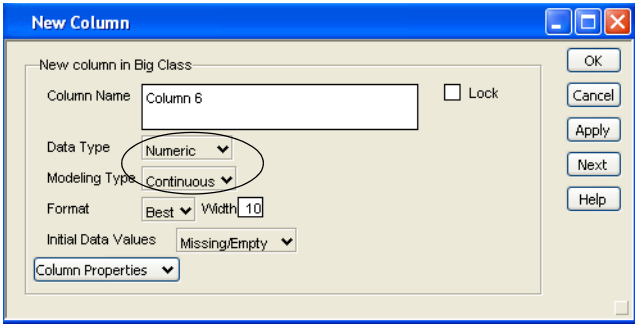
How to Assign Data and Modeling Types

There are three methods to assign data and modeling types or to make sure JMP has automatically given your data the correct types. The following sections describe these three methods.

Method 1: Create a New Column

One way to assign data and modeling types is when you create a new column. When you create a new column (by selecting **Cols > New Column**), the New Column window appears, as shown in Figure 3.12. Specify the data type and modeling type in this window.

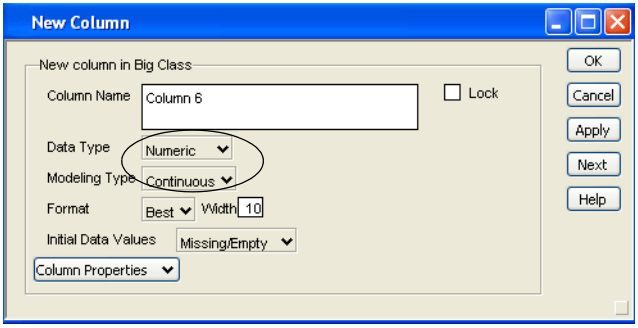
Figure 3.12 Add a New Column and Specify Data and Modeling Type



Method 2: Double-click the Area Above an Existing Column Name

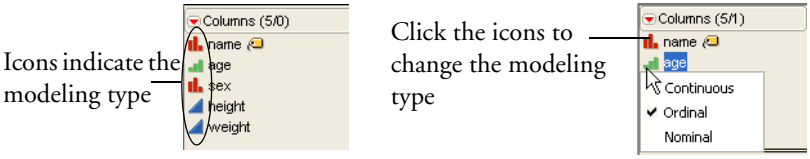
If your data is already in JMP and you want to assign data and modeling types, double-click the empty area above the name of the column. The Column Info window appears, as shown in Figure 3.13. Specify the data type and modeling type in this window.

Figure 3.13 Double-click an Existing Column and Specify Data and Modeling Type



Method 3: Use the Columns Panel Icons

If your data is already in JMP, click the icon beside the column name in the column panel that indicates its modeling type. Select a different type from the drop-down menu.



Note: You can select **Continuous** only if your data type is numeric. If **Continuous** is grayed on the menu and you want to make the column continuous, first change its data type in the Column Info window (access this window by highlighting the column and selecting **Cols > Column Info**).

Using Short-Integer Format

JMP has the ability to store numeric data in as few as 8 bits (one byte). To implement this, you need to tell JMP to first make short-integer formats available to you in the Column Info window's **Data Type** drop-down menu. Then you should specify how many bytes you want the integers to hold. When you use the correct short-integer format for your data, you will not see any difference in how the numbers display, but they will occupy less disk space and use less memory.

To store numeric data in short-integer format:

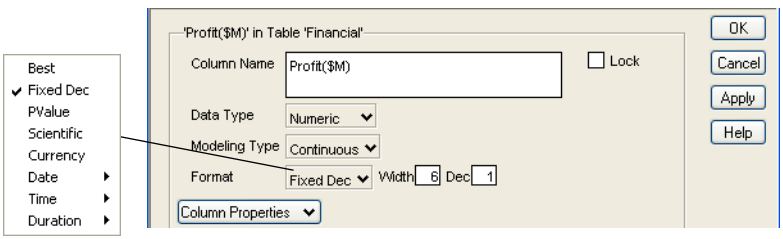
1 Select **File > Preferences** and click the **Tables** option on the left panel.
2 Click the **Allow Short Numeric** option.
3 Click **OK** to return to the data table.
4 Double-click the column name whose values you want to be short-integer. The Column Info window appears.
5 Click the **Data Type** drop-down menu, and select **1-byte integer**, **2-byte integer**, or **4-byte integer**. JMP will now store values as integers in the range corresponding to your selection. For example, when **1-byte integer** is selected, the range of numbers you can enter is from -126 to 127. When **2-byte integer** is selected, the range of numbers you can enter is from -32,766 to 32,767. When **4-byte integer** is selected, the range of numbers you can enter is from -2,147,483,646 to 2,147,483,647.

Choosing Numeric Formats

When you assign a variable's data type to be numeric, you can also specify the display format for it to use. To select the numeric format:

1 Select **Cols > Column Info** or double-click the area above the name of the column in the data grid. Or, if you are creating a new column, select **Cols > New Column**.
2 Click the drop-down menu beside **Format,** as shown in Figure 3.14, and select the option that specifies how you want JMP to display numeric values. See "Numeric Format Options," p. 63, for descriptions of options.

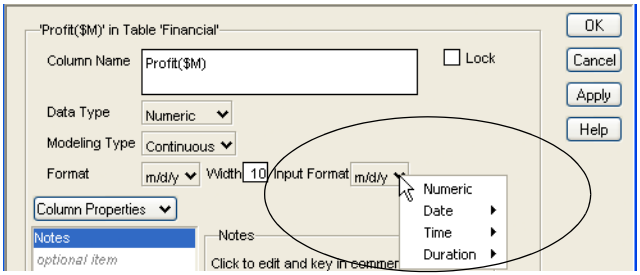
Figure 3.14 Column Info Window and Date-Time Formats



3 If you selected:

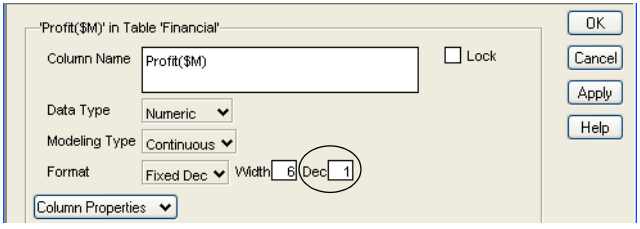
– **Date** or **Time** from the **Format** drop-down menu in Step 2, click the **Input format** menu that appears, as shown in Figure 3.15, and select which format dates or times will have when they are entered into JMP. See "Numeric Format Options," p. 63, for descriptions of options. See "Changing the Numeric Format of an Axis," p. 201, for a description of how to change the way a date or time appears in a graph without changing the way it appears in a data table.

Figure 3.15 The Input Format Option



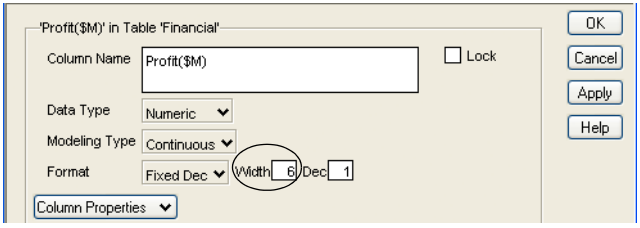
– **Fixed Dec** from the **Format** drop-down menu in Step 2, the **Dec** text box appears, as shown in Figure 3.16. Type the number of decimal places you want JMP to display in the data table. If the value doesn't have as many numbers after the decimal as the number you specify, JMP adds zeros to the number to give it that many decimal places. For example, if a value is 1.23 and you type **5** in the **Dec** box, JMP displays the number with five decimal places: 1.23000.

Figure 3.16 Specifying a Fixed Decimal



4 In the **Width** text box, type the number of characters you want the cell in the data table to accommodate. Be sure to type a number that is the largest number of digits or characters you think a value in the column could have. If your format is **Fixed Dec** and you set the width of the cell to be smaller than the number of decimal places you want in the values, JMP ignores the number of decimal places you specify and sets the column width to the number of characters you specify in the **Width** box.

Figure 3.17 Specifying a Fixed Width

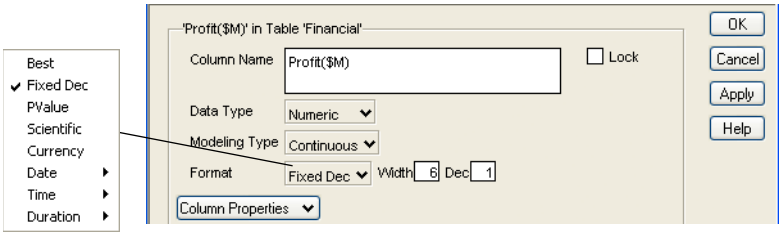


5 Click **OK**.

Numeric Format Options

The options in the **Format** (Figure 3.18) and **Input Format** drop-down menus are numeric formats that tell JMP how to display numbers in the data grid.

Figure 3.18 Column Info Window



Available options are:

Best Lets JMP consider the precision of each cell value and select the best way to show it. By default, the physical width of the column is 10 characters. You can increase the column width to show large values with many decimal places by typing the number of characters needed in the **Width** text box found in the Column Info window.

Fixed Dec Displays all column values rounded to the number of decimal places you specify. You can set the number of decimal places to zero to see only whole numbers. Type the number of decimal places you want JMP to display into the **Dec** text box in the Column Info window.

Percent Multiplies numeric values by 100 and displays the result followed by a percent sign.

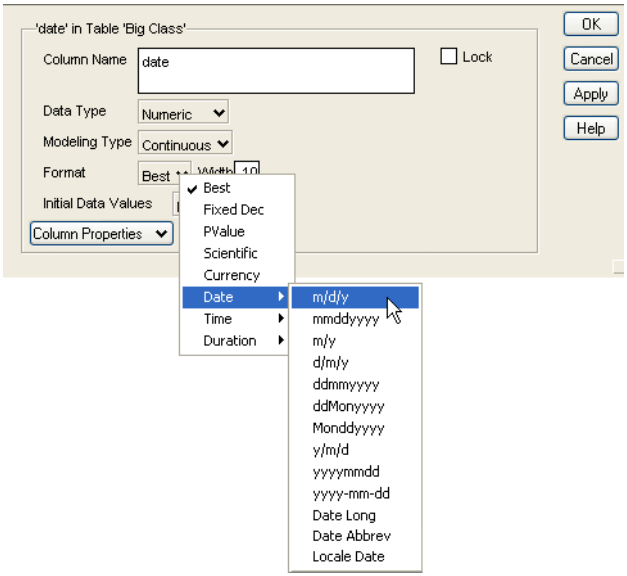
PValue Displays probability values. It has a default width of six and shows four decimal places. If a number is less than 0.0001, the number is displayed as <.0001. The format is mostly used in JSL scripts and rarely needed for a data table column.

Scientific Displays a number in standard scientific notation. If you enter the number 123456, it appears as 1.23456e+5.

Currency Formats values with two decimal positions, separators, and the currency sign appropriate for your computer's locale settings. For example, if you enter the number 123456, it shows in the data table on an American system as $123,456.00. The default width of the **Currency** format is 10. If you have a number that requires a wider field width, the format defaults to the **Best** format. You can increase the column width to show large values with many decimal places by typing the number of characters needed in the **Width** text box found in the Column Info window.

Date Displays all column values as a date. If you assign a date format to a numeric column that already contains data, then the numeric values are treated as the *number of seconds since January 1, 1904*. For example, if you have a numeric column with a cell value of 1,234,567,890 and you change the format to Date > m/d/y, the cell value will be displayed as 02/13/1943. As shown in Figure 3.19, you can leave the date values displayed as described above, or select one of these formats: (The examples below show formats for reading or displaying the date, December 31, 2004. Its unformatted (numeric) value is 3,187,296,600.)

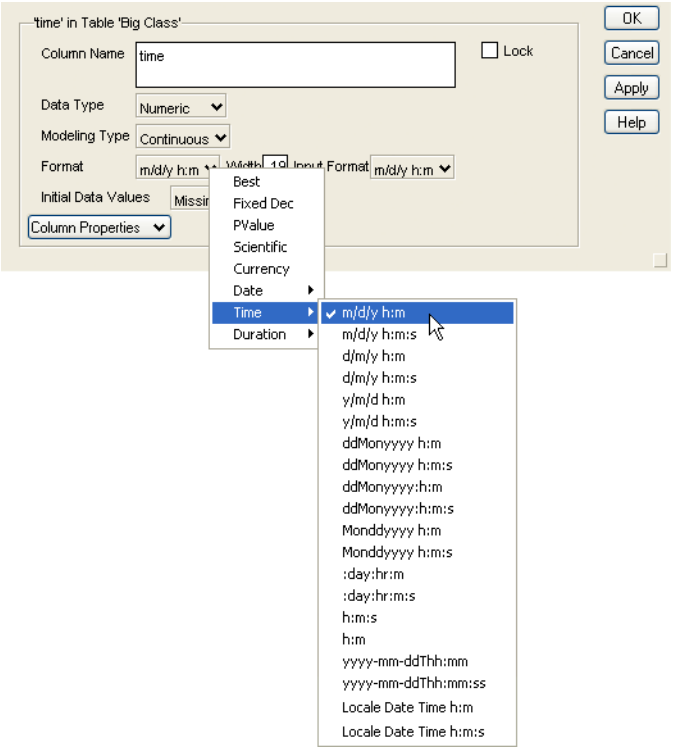
Figure 3.19 Date Formats



- **m/d/y** has the form of *mm/dd/yyyy*, giving 12/31/2004.
- **mmddyyyy** has the form of *mmddyyyy*, giving 12312004.
- **m/y** has the form of *mm/yyyy*, giving 12/2004.
- **d/m/y** has the form of *dd/mm/yyyy*, giving 31/12/2004.
- **ddmmyyyy** has the form of *ddmmyyyy*, giving 31122004.
- **ddMonyyyy** has the form of *ddMonyyyy*, giving 31Dec2004.
- **Monddyyyy** has the form *Monddyyyy*, giving Dec312004.
- **y/m/d** has the form *yyyy/mm/dd*, giving 2004/12/31.
- **yyyymmdd** has the form *yyyymmdd*, giving 20041231.
- **yyyy-mm-dd** has the form *yyyy-mm-dd*, giving 2004-12-31.
- **Date Long** shows a date value as *weekday, month day, year*, which gives Tuesday, December 31, 2004. When using this option, you might need to increase the column width to see the formatted value in its entirety. Do this by double-clicking the column name and entering the needed number of digits or characters into the box labeled **Width**.
- **Date Abbrev** is the same as the **Long** format except that weekday and month have three-character abbreviations, such as Tue, Dec 31, 2004. When using this option, you might need to increase the column width to see the formatted value in its entirety. Do this by double-clicking the column name and entering the needed number of digits or characters into the box labeled **Width**.
- **Locale date** displays a JMP date value according to the settings of your operating system. For example, the local OS setting for date in the United states is the format **mm/dd/yyyy**.

Time displays all column values as an instance in time using one of these formats (shown in Figure 3.20). An example of an instance is a specific date in time, such as 12/2/03 at 2:23 PM.

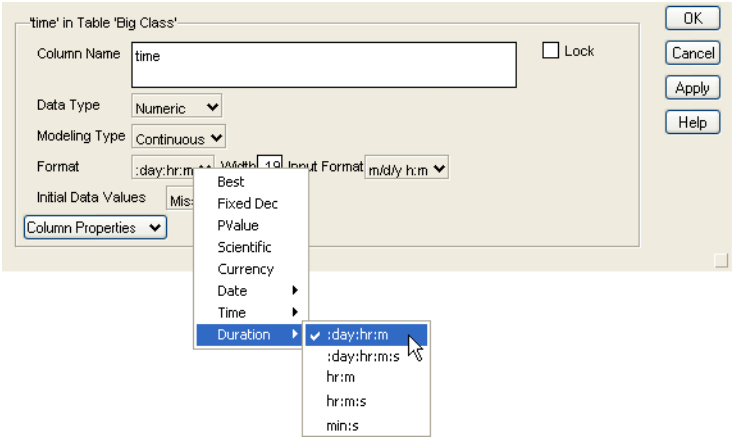
Figure 3.20 Time Formats



- **m/d/y h:m**, **m/d/y h:m:s**, **d/m/y h:m**, **d/m/y h:m:s**, **y/m/d h:m**, **y/m/d h:m:s**, **ddMonyyyy h:m**, **ddMonyyyy h:m:s**, **ddMonyyyy:h:m**, **ddMonyyyy:h:m:s**, **Monddyyyy h:m**, **Monddyyyy h:m:s** show the number of hours, minutes, and seconds after midnight of the prepended date. The date appears in the formats described above. The hours, minutes, and seconds are separated by a colon. This example (12/31/2004) has no hours or minutes. Examples of its formatted values with zero hours minutes and seconds are 12/31/2004 12:00 AM and 12/31/2004 12:00:00 AM.
- **:day:hr:m, :day:hr:m:s** show the number of days, hours, minutes, and seconds since January 1, 1904. The results for December 31, 2004 are :36890:00:00: and :36890:00:00:00.
- **h:m:s,** d **h:m** gives hours, minutes, and seconds portion of the date in the date field. The example used here (December 31, 2004) has no time entered, so the result is 00:00:00.
- **yyyy-mm-ddThh:mm, yyyy-mm-ddThh:mm:ss** show the year, month, day, and time. For example, 2004-12-31T17:34:54. T is a literal, representing itself.
- **Locale Date Time h:m** and **Locale Date Time h:m:s** display a JMP time value according to the settings of your operating system. For example, the local OS formats for time in the United states are the formats **mm/dd/yyyy hh:mm** and **mm/dd/yyyy hh:mm:ss**.

Duration displays all column values as a duration of time using one of these formats (shown in Figure 3.21). An example of duration is hours, minutes, and seconds.

Figure 3.21 Duration Formats



- **:day:hr:m, :day:hr:m:s** show a duration of time, such as 52:03:01:30 (:day:hr:m:s), which reads fifty-two days, three hours, one minute, and thirty seconds.
- **hr:m**, **hr:m:s**, **min:s** shows a duration of time, such as 17:37 (hr:m), which reads seventeen hours and thirty-seven minutes.

Working With International Formats

If you are importing or entering data that contains formatting specific to country standards, you might need to make sure your number formats are interpreted correctly. To do this on Windows, access the Control Panel's time/region and language option, and select the country for which the number should be formatted. On the Macintosh, select **System Preferences** from the apple menu, and then select **International**, and then select **Numbers**, and select the correct country. On Red Hat 7.x, under KDE, select **Preferences > Personalization > Country & Language**. On Red Hat 9 in both KDE and GNOME's main menu, select **System Settings > Language**.

Entering Data

The following sections describe how to enter data into a table, including entering data one cell at the time or adding rows and columns of data at once.

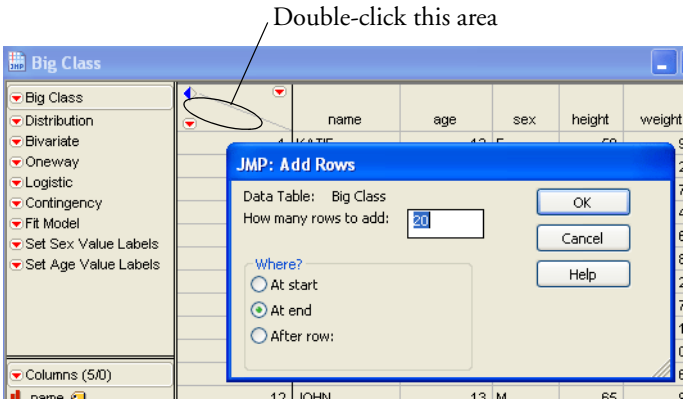
Adding and Deleting Rows

To add new empty rows, take one of the following actions:

- Select **Rows > Add Rows**. Then enter the number and location of rows you want to add. By default, new rows appear at the end of the table.

- Click in a cell anywhere below the last row in a table and begin typing. Then press Enter (or Return) to automatically generate new rows up to and including the row with the value you typed.
- Double-click an empty row number area below the last row to add that many empty rows.
- Double-click the lower triangular area in the upper left corner of the data grid, as shown in Figure 3.22. Then enter the number of rows to add and specify where you would like to add them.

Figure 3.22 Double-click the Lower Triangular Area



To delete rows from the data grid:

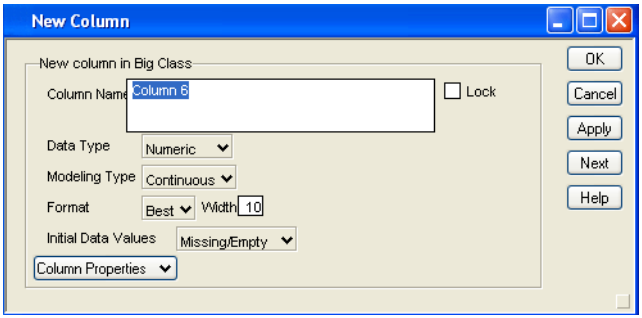
1 Highlight the rows you want to delete.
2 Select **Rows > Delete Rows,** or right-click (Ctrl-click on the Macintosh) the rows and select **Delete Rows**.
3 If you mistakenly delete rows, select **Edit > Undo Delete Rows**.

Adding and Deleting Columns

To add new empty columns, take one of the following actions:

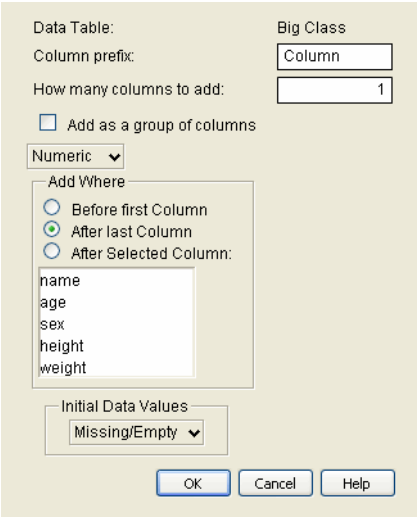
- Double-click the empty space to the right of the last data table column and begin typing.
- Select **Cols > New Column**. The window in Figure 3.23 prompts you to name the new column and provide column characteristics, including the type of data with which you initially want to fill the column. Click **Next** to add another column and click **OK** to see the new column(s) appear in the data table. The New Column window also gives options of assigning properties to columns using the **Column Properties** button. See "Assigning Properties to Columns," p. 140, for details.

Figure 3.23 The New Column Window



- Select **Cols > Add Multiple Cols** (or double-click the upper triangular area in the upper left corner of the data grid). Using the **Add Multiple Columns** command to define multiple columns is different from using the **New Column** command because all columns you add with the Add Multiple Columns window will have the same data characteristics. By default, the new column names are Column 1, Column 2, and so on. However, you can specify other text that becomes the prefix of the new column names by typing into the **Column prefix** box. Then, as shown in Figure 3.24, enter the number of columns to add, specify if they are to be grouped, select a data type, enter their location, and select the initial data values. (See "About Data Types," p. 58, for details.)

Figure 3.24 The Add Multiple Columns Window



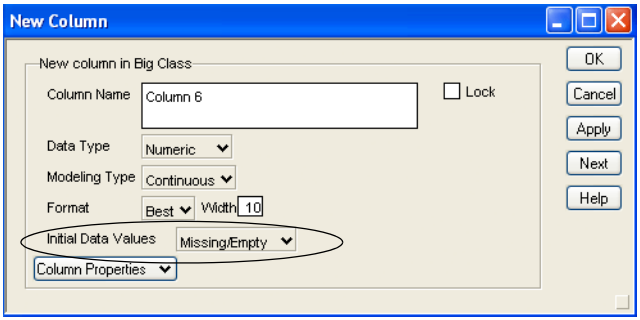
To delete columns from the data table

1 Highlight the columns to delete.
2 Select **Cols > Delete Columns**.
3 If you mistakenly delete columns, select **Edit > Undo Delete Columns**.

Setting Up Initial Data Values

When you add a new column to a data table (select **Cols > New Column**), you can specify the type of data values you want to appear in the column, as shown in Figure 3.25.

Figure 3.25 Initial Data Values

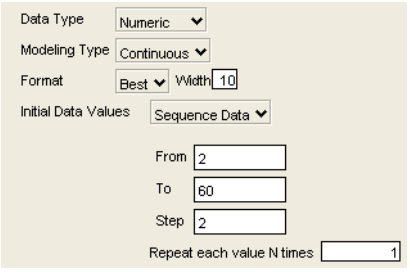


Missing/Empty Places missing values in the column, represented by a black dot (•) for numeric data and a blank for character data.

Constant Places one number in all the column's rows for numeric data. Select **Constant**, and then specify what number you would like to use by typing it into the box that appears. For character data, any number of characters can be entered into this box.

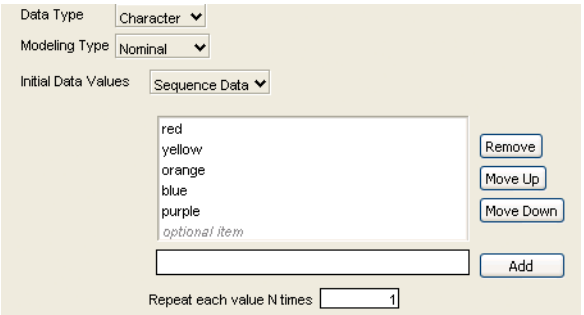
Sequence Data Inserts sequential data based on the parameters you specify in the boxes that appear. For numeric data, as shown in Figure 3.26, select **Numeric** in the Data Type box and select **Sequence Data** for the Initial Data Values. Assign a starting and ending point in the **From** and **To** boxes, and then assign the sequence in the **Step** box. For example, if you want the column to contain even numbers from 2 to 60, type **2** in the **From** box, **60** in the **To** box, and **2** in the **Step** box. In the **Repeat each value N times** box, type the number of times you want each numeric value repeated. Click **OK**.

Figure 3.26 Entering Numeric Details for Sequence Data



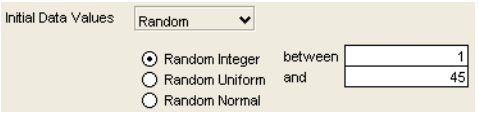
For character data, as shown in Figure 3.27, select **Character** in the Data Type box and select **Sequence Data** for the Initial Data Values. In the box next to Add, type the character data and click **Add**. In the **Repeat each value N times** box, type the number of times you want each character value (such as red) repeated. Click **OK**.

Figure 3.27 Entering Character Details for Sequence Data



- **Random** Inserts random data into the column. Click the button beside the type of random number you want to use, and then enter either a range for random integers and random uniform numbers or the mean and standard deviation for random normal numbers (Figure 3.28).

Figure 3.28 Entering Details for Random Data

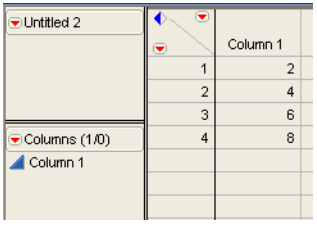


Filling Columns with Sequential Data

You can fill a column with either a repeating sequence of data or with a continuation of values:

1 Create a sequence of data in a column, as shown in Figure 3.29.

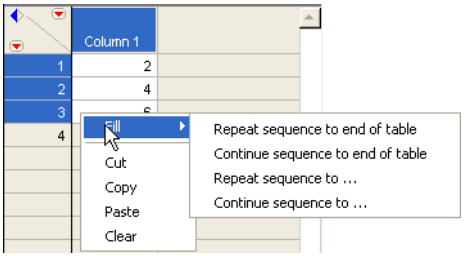
Figure 3.29 Sequence of Data



2 Highlight the cells containing the sequence of data.

3 Right-click (Ctrl-click on the Macintosh) the selected cells and select an option shown in Figure 3.30.

Figure 3.30 Data Filling Options



Repeat sequence to end of table Cells below the selection are filled with repeats of the selected cells.

Continue sequence to end of table Cells below the selection are filled with a continuation of the pattern found in the selected cells. For example, if the selected cells contain the numbers 1 and 2, then the remaining cells will be filled with 3, 4, 5, 6, and so on. If the selected cells contain the numbers 2 and 4, then the remaining cells will be filled with 6, 8, 10, 12, and so on.

Repeat sequence to... JMP repeats the pattern found in the selected cells to the row number you specify.

Continue sequence to... JMP continues the pattern found in the selected cells to the row number you specify.

Entering Cell Formulas

In numeric columns, you can enter cell expressions preceded by an equal sign (=). JMP immediately evaluates the expression and stores the new number as the cell's value. Unlike column formulas, a cell expression is not stored.

Cell expressions can contain operators, constants, and global and column variables.

To enter an expression:

1 Click the cell in which you want to enter the expression.
2 Type an equal sign (=).
3 Enter the expression.
4 Press Enter or Return on your keyboard.

Table 3.2 Examples of Expressions in Table Cells

Example expression	Cell value
`=sqrt(2)`	1.41
=456+890	1346
`=height+weight`	Sums the values of cells in columns height and weight located in the same row as the cell you entered the expression.
`=height[1]`	Displays the value found in row 1 of the height column

Editing Data and Tables

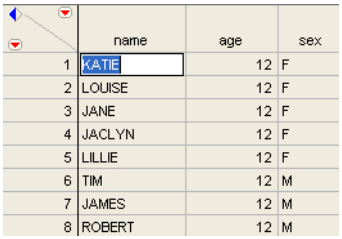
The following sections describe how to edit data that is in a table, including editing cells themselves and making changes to rows and columns.

Editing Cells

To edit the contents of a cell:

1 Click a cell that already has a value. It is highlighted, as shown in Figure 3.31

Figure 3.31 Editing the Contents of a Cell



	name	age	sex
1	KATIE	12	F
2	LOUISE	12	F
3	JANE	12	F
4	JACLYN	12	F
5	LILLIE	12	F
6	TIM	12	M
7	JAMES	12	M
8	ROBERT	12	M

2 Click it a second time. The cursor becomes a flashing text insertion bar.

3 Edit its value.

Editing Column Names

There are many ways to edit a column name. Choose a way from the list below:

- Select the column and begin typing.
- Select the column, and then click the column name and edit.
- Double-click or right-click the empty area around the column name and select **Column Info**. Edit the name in the Column Info window that appears.
- Double-click the column name in the column panel and begin typing.

Recoding Data

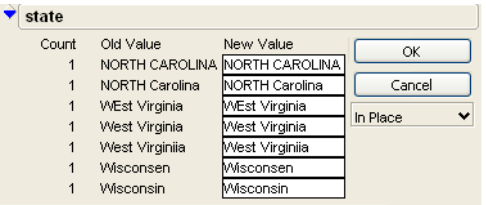
If you have data that is coded incorrectly (for example, contains typos or incorrect wording), you can quickly recode it so it follows a consistent format. You can also use recode to replace missing or empty values.

JMP displays a window that contains selected columns' unique values and enables you to enter new values to replace them:

1 Highlight the column(s) that contain data you would like to recode.

2 Select **Cols > Recode**. The Recode window appears (Figure 3.32). In this window, the Count column lists the number of occurrences each value has in the data table.

Figure 3.32 Enter New Values



3 Type the new value in the text box corresponding to the old value you want to change.

4 Click **OK**.

Tip: If you want to apply the same new value to several old values, type the value once, and then copy and paste into the other text boxes.

Command Options

The first three commands apply to all items in the data table list.

Convert to Titlecase converts to title case, that is, an initial uppercase character and subsequent lowercase characters.

Convert to Uppercase converts all items to uppercase

Convert to Lowercase converts items to lowercase.

Often, when importing data tables, tab characters, space characters, and line separators are imported with the data table. These two commands are used to remove these characters.

- **Trim Whitespace** removes leading and trailing whitespace. For example, if an extra space was imported before and after the name John, this command would delete the spaces.
- **Collapse Whitespace** trims leading and trailing whitespace and removes duplicate interior white spaces. That is, if more than one white space character is present, the **Collapse Whitespace** command replaces the two spaces with one space.

The drop-down menu enables you to apply the recode changes to three options.

In Place applies any change to the original data column.

New column creates a new column for the changed data.

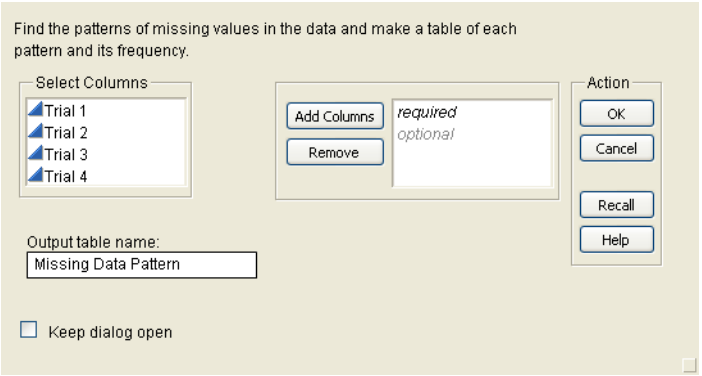
Formula Column creates a new column with the changes as a formula.

Viewing Patterns of Missing Data

If your data table contains missing data, you might want to determine whether there is a pattern that the missing data creates. The pattern might help you make discoveries about your data. Selecting **Tables > Missing Data Pattern** shows you this pattern in a data table format:

1 Select **Tables > Missing Data Pattern**. The Missing Data Pattern window appears (Figure 3.33).

Figure 3.33 The Missing Data Pattern Window



2 Highlight the columns from which you would like to find missing data.

3 Click **Add Columns**, and then click **OK**. The Missing Data Pattern table (Figure 3.34) appears.

Figure 3.34 A Missing Data Pattern Table

	Count	Number of columns missing	Patterns	Trial 1	Trial 2	Trial 3	Trial 4
1	2	0	0000	0	0	0	0
2	2	1	0001	0	0	0	1
3	2	2	0011	0	0	1	1
4	1	3	0111	0	1	1	1

Figure 3.34 shows the following patterns:

- Row 1 shows that there are two instances where all rows in Trial 1, Trial 2, Trial 3, and Trial 4 have no missing values.
- Row 2 shows that there are two rows in the source table whose one missing value is in the Trial 4 column.
- Row 3 shows that there are two rows in the source table whose missing values are in the Trial 3 and Trial 4 columns.
- Row 4 shows that there is one row in the source table whose three missing values are in the Trial 2, Trial 3, and Trial 4 columns.

In the Missing Data Pattern table, JMP automatically assigns the Count column the analysis role of *frequency*. Now if you use the Missing Data Pattern data table to run an analysis, JMP automatically uses Count as a frequency so you do not have to specify its role each time. See "Giving Columns a Preselected Analysis Role," p. 138, for details.

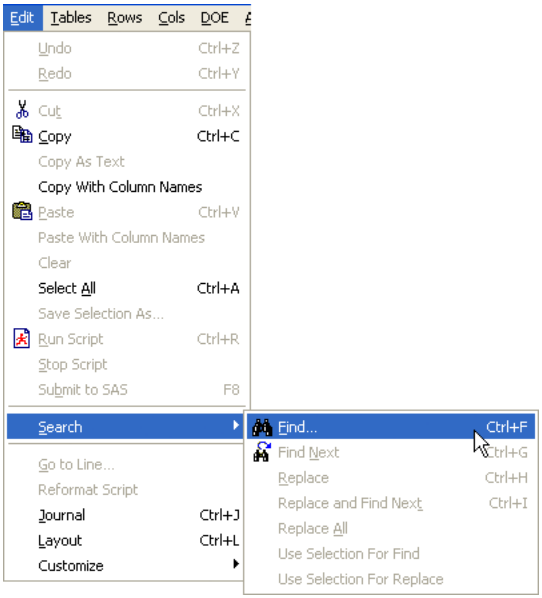
Finding and Replacing Cell Values

Selecting **Edit > Search** gives you many search options, as shown in Figure 3.35. The following rules apply to searching for values:

- To find values in hidden columns or locked tables, unhide the column or unlock the table.
- Values found in locked columns cannot be modified.

- The **Undo** command works only with **Replace**. You cannot undo **Replace All**.
- If your data table contains value labels, using the **Search** commands will search for actual values, but will not search for labels. (See "Using Value Labels," p. 147.)

Figure 3.35 Search Choices

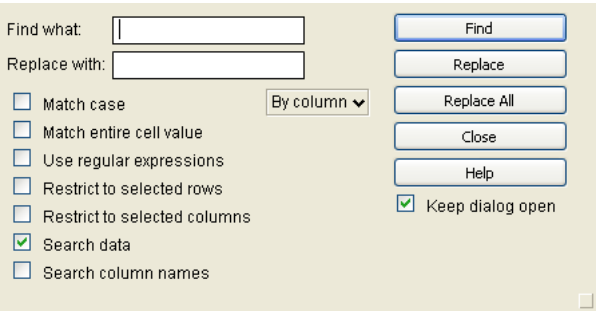


To find (or find and replace) values:

1 Select **Edit > Search > Find**. The window in Figure 3.36 appears.
2 Enter a value in the **Find what** box.

Note: To find missing character values, leave the **Find** field empty and check **Match whole words only**. To find missing numeric values, insert a period into the **Find** field and check **Match whole words only**.

Figure 3.36 The Search Feature (Windows)



3 Type a value in the **Replace with** field, if you would like to replace the values found with a different value.

4 Refine your search. Select any of the following:

Match Case Gives a case sensitive search, useful for locating proper nouns or other capitalized words.

Match whole words only Detects empty spaces, which lets you search for a series of words in a character column, or locate strings with unwanted leading or trailing empty spaces. Using the **Match whole words only** check box also locates words with at least one leading and one trailing empty space.

Restrict to selected rows restricts the search to selected rows.

Restrict to selected columns restricts the search to selected columns.

Search Data searches only data cells (omitting column names).

Search Column Names searches only column names (omitting data cells).

Use Regular Expressions assumes the find string to be a regular expression instead of the literal string you enter in the Find What box. The regular expressions follow standard semantics.

Direction **By column** searches the table column by column, from top to bottom, until it reaches the last cell in the rightmost column, or until you stop the search. **By row** searches the data table row by row from left to right, to the rightmost cell in the last row or until you stop the search.

5 Use the table below to start searching:

Action	Instructions
Search the active table for the find value.	Click the **Find** button. The search begins with the first cell in the first column and searches every cell until it locates the value or reaches the end of the table.
Replace the currently highlighted cell value with the contents of the **Replace with** field, which contains the replace value.	Click the **Replace** button. Or, if the Search window is closed, select **Edit > Search > Replace**. If the replace value is a missing value, the currently highlighted cell content becomes a missing value.
Replace all occurrences of the specified value with another value.	Click the **Replace All** button. Or, if the Search window is closed, select **Edit > Search > Replace All**.
Automatically replace the value and search for the next value.	Click the **Replace** button. Or, if the Search window is closed, select **Edit > Search > Replace and Find Next**. Or use Ctrl-L (Windows) or Command-L (Macintosh).

Action	Instructions
Use the selected value for **Find what**.	On Windows and Macintosh, go to the data table and click in a cell. Now that you have selected a value, select **Edit > Search > Use Selection for Find**. Next, select **Edit > Search > Find**. The value you selected in the data table is already entered in the **Find what** field.
Use the selected value for **Replace with**.	On Windows, you can select **Edit > Search > Use Selection for Replace** to populate the **Replace with** field.
Find the next value in the table when the Find window is closed.	Select **Edit > Search > Find Next**. Or, use Ctrl-G (Windows) or Command-G (Macintosh).
Find a missing value.	In the Search window, choose from these options: • To find missing character values, leave the **Find** field empty and check **Match whole words only**. • To find missing numeric values, type a period into the **Find what** text box and check **Match whole words only**. **Note:** Typing a period into the text box without clicking the **Match whole words only** box searches for a period.

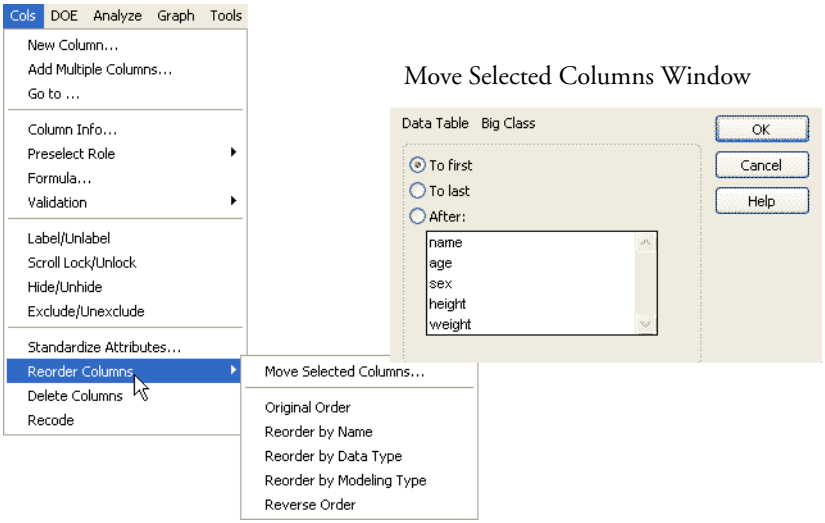
Reordering Columns

You can rearrange, or sort data table columns by their name, data type, or modeling type, or you can reverse their current order. You can also move selected columns to a particular place in the data table. To reorder columns:

1 Select **Cols > Reorder Columns**.

2 Make a selection from the submenu, as shown in Figure 3.37.

Figure 3.37 Choices for Reordering Columns



Move Selected Columns Moves the selected columns to a particular place in the data table. When you select **Move Selected Columns**, the Move Selected Columns window shown below appears with the following choices:

To first: Moves the selected columns so they are in the left-most position in the data table.

To last: Moves the selected columns so they are in the right-most position in the data table.

After: Moves the selected columns so they are after a column you identify

Original Order Returns the columns to the order they were in at the time the data table was last saved.

Reorder by Name Arranges the columns (except for row state columns) from left to right in alphabetical order by column name.

Reorder By Data Type Arranges the columns from left to right in alphabetic order by data type (character, numeric, row state).

Reorder By Modeling Type Arranges the columns from left to right in alphabetic order by modeling type (continuous, ordinal, nominal). Row state columns have no modeling type, and are shown last.

Reverse Order Reverses the order of the data table columns.

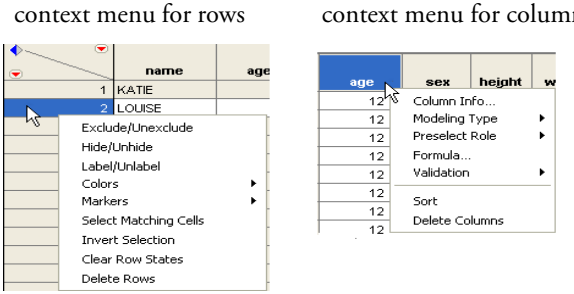
If you mistakenly move one or more columns, select **Edit > Undo Move Columns** (**Edit > Undo** on Linux) to restore the previous order.

Rows and Columns Context Menus

When you right-click (hold the CONTROL key and click on Macintosh) in the row number area, or at the top of a column in the column name area, the context menus shown in Figure 3.38 appear. These menus give you quick access to selected **Rows** and **Columns** menu commands. Documentation of all the **Rows** and **Cols** menu command can be found in Appendix B, "Main Menu," p. 419.

Note: The **Sort** command in the context menu for columns gives you a quick way to sort a data table by a single column in ascending values of that column. The context menu **Sort** command does not display a window with sort options.

Figure 3.38 Context Menus for Rows and Columns



Copying, Cutting, and Pasting

You can copy or cut and paste in JMP data tables by selecting **Edit > Copy** or **Edit > Cut,** and then **Edit > Paste.** Data you cut or copy to the clipboard can be pasted into data tables or other applications.

- If one cell is selected, **Edit** commands apply only to that cell. If no columns are selected, **Edit** commands apply to all selected rows. Likewise, if no rows are selected, **Edit** commands apply to all selected columns. If you select both rows and columns, **Copy** copies the subset of cells defined by their intersection.
- The **Edit** commands affect all values in selected rows if no columns are selected. They affect all values in selected columns (except the header field) if no rows are selected.
- When both rows and columns are selected, **Edit** commands affect the subset of cells defined by the intersection of those rows and columns.

The **Copy** and **Paste** commands in the **Edit** menu function as listed in Table 3.3:

Table 3.3 Using Copy and Paste

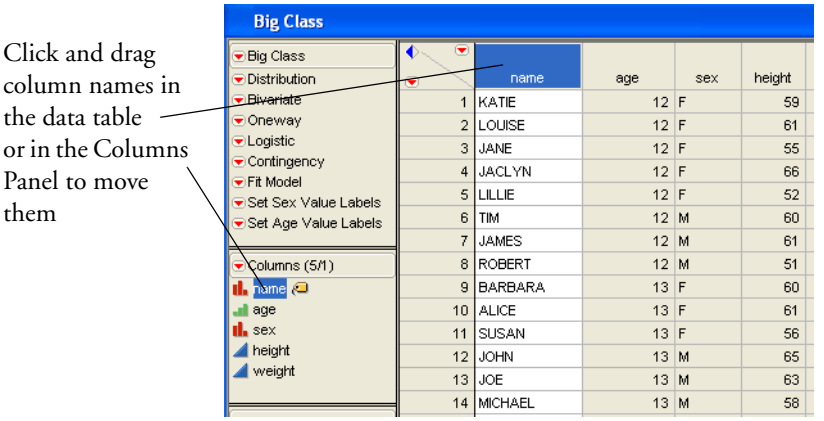
Action	Instructions
Copy highlighted rows, columns, a single cell, or combination of cells from the active data table to the clipboard	Select **Edit > Copy**. On the clipboard, fields are delimited by tab characters and a return character indicates an end of row.
Paste information from the clipboard to the highlighted area in a JMP data table	Select **Edit > Paste.** This command can be used with the **Copy** command to duplicate rows, columns, or any subset of cells defined by highlighted rows and columns.
Duplicate an entire row or column	Highlight the row or column to be duplicated and select **Edit > Copy.** Then highlight an existing row or column to receive the values select **Edit > Paste**.

Table 3.3 Using Copy and Paste

Action	Instructions
Duplicate a subset of values	Highlight the cells and select **Edit > Copy.** Then highlight an existing row or column to receive the values and select **Edit > Paste.** You must highlight the same arrangement of rows and columns to receive the copied values as originally contained them. • If you paste data with fewer rows into a destination with more rows, the source values recycle until all receiving rows are filled. • If you paste more rows or columns than you have highlighted, the excess values are lost unless you are pasting to the end of a data table. • If you highlight no rows or columns before you paste, rows and columns are added as needed.
Transfer data from another application into a JMP data table by copying and pasting	First copy the data to the clipboard from within the other application. Then select **Edit > Paste** to paste the values into JMP. Pasting automatically creates rows and columns as needed.
Copy using the first line of data as column headings	Select **Edit > Copy With Column Names**.
Paste using the first line of data as column headings	Select **Edit > Paste With Column Names**.

Moving and Duplicating Values

Drag and drop is a convenient way to move or duplicate values in a data table.



To move columns, cells, or rows:

1 In either the data table or in the columns panel, highlight the columns, cells, or rows you want to move. To rearrange several columns, cells, or rows, Shift-click or Ctrl-click (Option-click on the Macintosh). Release the mouse.

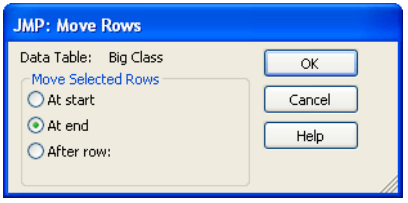
2 Click the highlighted columns, cells, or rows and drag to the new position. If you do this with discontinuous columns, cells, or rows, they become contiguous when dropped. Note that when

dragging and dropping *cells*:

- They retain all of their characteristics and column properties.
- They leave missing values in the original cells, and they replace the values at their destination if the data types are the same.
- If you drag a set of cells to an empty area of the table, new columns are automatically created.

Also note that another way to move *rows* is to:

1 Highlight the rows you want to move.
2 Select **Rows > Move Rows**.
3 Specify where you would like to move the rows in the Move Rows window. Click the appropriate button to move highlighted rows to the beginning of the table (**At start**), to the end of the table (**At end**), or after a specific row number (**After row:**).



To duplicate columns, cells, or rows:

1 In either the data table or in the columns panel, highlight the columns, cells, or rows you want to duplicate. To duplicate several columns, cells, or rows, Shift-click or Ctrl-click (Option-click on the Macintosh). Release the mouse.
2 Ctrl-click (Option-click on the Macintosh) the highlighted columns, cells, or rows and drag to the new position. If you do this with discontinuous columns, cells, or rows, they become contiguous when dropped. Note that:

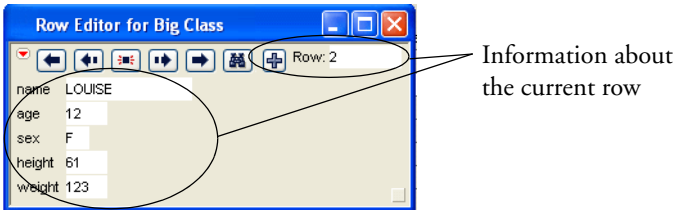
- The new columns have the original columns' display format, but not necessarily their modeling types.
- If you drag a set of cells to an empty area of the table, new columns are automatically created. Your values are copied to the destination, leaving the original values intact.

Using the Row Editor

The row editor lets you browse or edit cells one row at a time. You can access the row editor from an output report or from the data table. (See "Pasting Reports into Another Program," p. 177.) To use the row editor from the data table:

1 Highlight a row in the data table.
2 Select **Rows > Row Editor** or double-click a row to display information about the current row.

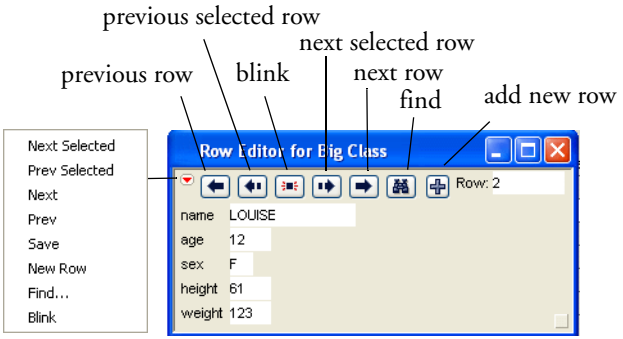
Note: If you are inside of a plot instead of a data table, right-click (hold the CONTROL key and click on Macintosh) inside the plot and select **Row Editor** to access the row editor.



3 Edit the data. Note that if your data table contains value labels, the row editor will display the label, and when the cell is highlighted for editing, it will show the actual value. (See "Using Value Labels," p. 147.)

4 Click the arrow buttons to browse through selected rows or the entire data set if no rows are selected. Figure 3.39 shows the function of each button.

Figure 3.39 The Row Editor



5 Click the red triangle icon in the row editor to select one of the following:

Next Selected Displays information for the selected row that is located after the current one.

Prev Selected Displays information for the selected row that is located before the current one.

Next Displays information for the row that is located after the current one, regardless of whether the row is selected.

Previous Displays information for the row that is located before the current one, regardless of whether the row is selected.

Save Saves the data table and any changes you have made to it via the row editor.

New Row Creates a new row in the data table.

Find Displays the same window as if you had selected **Rows > Row Selection > Select Where**. Select one of the options on the **Action on currently selected rows menu**, and then highlight the column whose rows you want to select. Type in the value for which you want JMP to search. See "Selecting Cells with Specific Values," p. 92, for details.

Blink Causes the current row's highlight to flash at a rapid rate.

Note: Text in a locked column or a locked data table cannot be edited. See "Locking Columns," p. 143, and "Locking Tables," p. 83, for details.

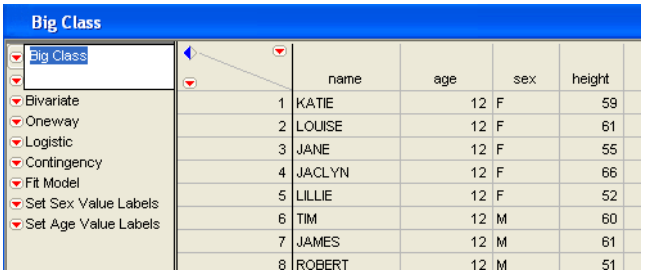
Changing Table Names

A data table's name is found at the top of its window, in the table panel, and on all analysis reports. It is the name by which it has or will be saved.

To change a table's name:

1 Click the table name in the table panel. It is highlighted, as shown in Figure 3.39.

Figure 3.40 Changing a Table's Name



2 Click it a second time. The cursor becomes a flashing text insertion bar.

3 Type name you want.

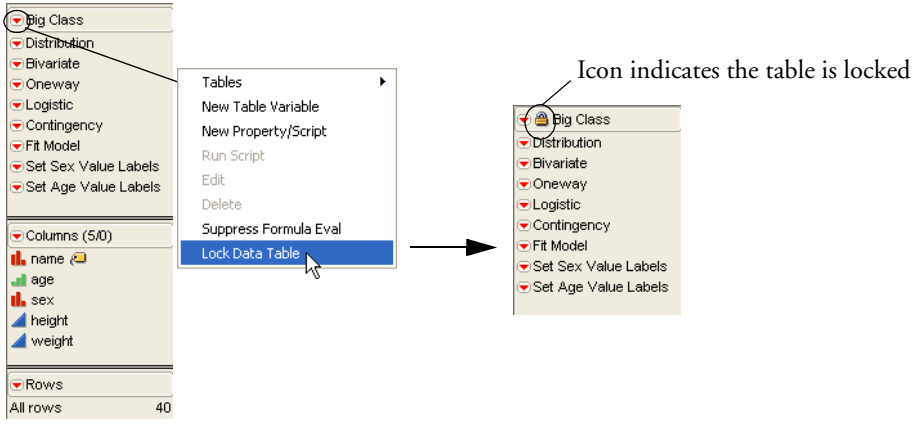
On Windows, you can also change a data table's name by selecting **Window > Set Title**.

Locking Tables

There are two ways you can lock a JMP data table:

- You can lock a table so its values cannot be edited. However, you can run analyses, assign characteristics, and so on. To do this, select **Lock Data Table** from the table panel menu (Figure 3.41).

Figure 3.41 Lock the Table so Values Cannot be Edited



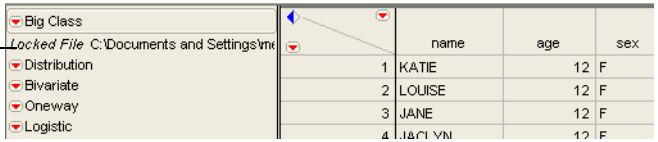
To unlock the file, select **Lock Data Table** again.

- You can lock a table so it can be edited but not saved. To do this, change the file's properties according to your computer's operating system. For example, change the file to be "Read-Only."

Then, when you open it in JMP, you will see *Locked File* in the table panel underneath the table's name, as shown in Figure 3.42.

Figure 3.42 A Locked File

Indicates that the file is locked and tells you where the file is located on your computer



If a file is locked in both ways described above, unlocking the file by selecting **Lock Data Table** from the table panel also removes its "Read-Only" setting.

Note: You can lock a column in place so when you scroll horizontally, the column remains visible. See "Locking Columns in Place," p. 138, for details.

Adding Table Variables

Table variables are character strings that are available to the entire table. They are any constant value that is always available in the data table. Table variable names are displayed in the table panel at the left of the data grid, as shown in Figure 3.43.

Figure 3.43 Table Variables are Located to the Left of the Data Grid

Table variables

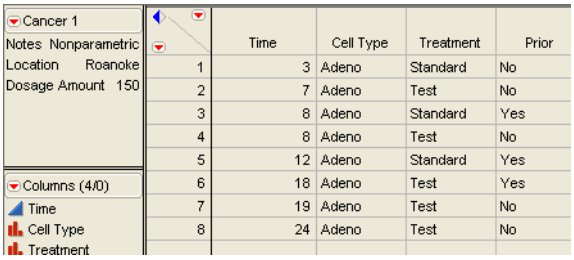
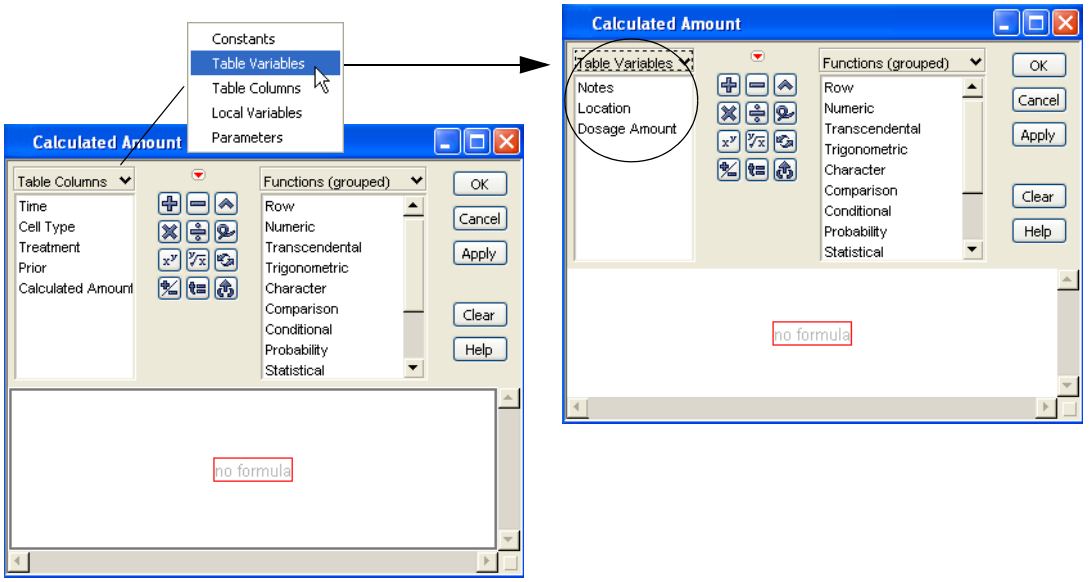


Table variables are mostly used to document tables. For example, when you installed JMP, a folder named Sample Data was also installed. Many files in the Sample Data folder contain a table variable called Notes, which contain descriptive information. The example in Figure 3.43 shows a data table that contains Notes as one of its table variables. JMP also automatically creates table variables when you create a design table with the Design of Experiments commands in JMP. The design table has a table variable named Design with the name of the design type as its value.

Table variables can also be incorporated in formulas you build using the formula editor, as shown in Figure 3.44. These formulas calculate values for a column by referring to a table variable. See "Referencing Columns and Table Variables," p. 288, for details about constructing a formula that uses table variables.

Figure 3.44 Table Variables Can Be Used In Formula Creation



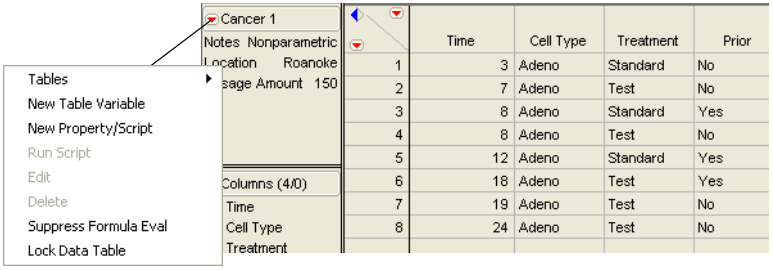
Another use for table variables is to incorporate them into JSL scripts. See the *JMP Scripting Guide* for details.

Adding New Table Variables

1 Click the red triangle icon to the left of the data table name in the tables panel.

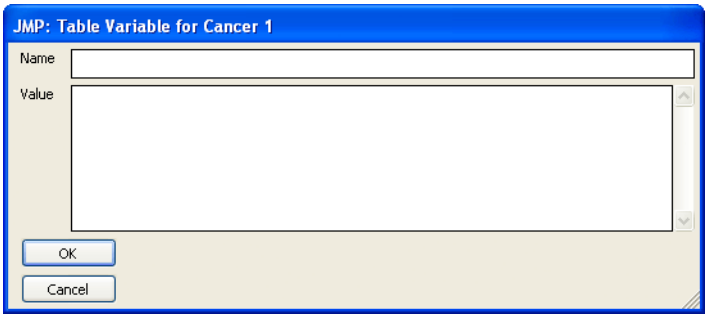
2 Select **New Table Variable** from the drop-down menu, as shown in Figure 3.45.

Figure 3.45 Creating a Table Variable



3 Give the variable a name and value in the boxes labeled **Name** and **Value**, as shown in Figure 3.46.

Figure 3.46 Naming and Defining the Table Variable

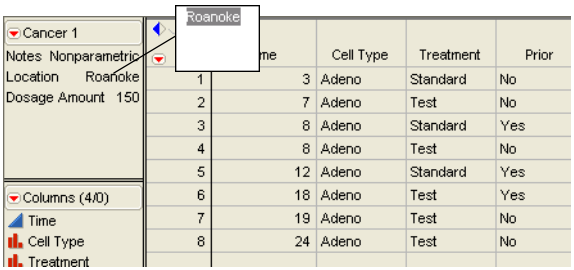


4 Click **OK**. The table variable appears in the tables panel.

Viewing or Editing Table Variables

1 Click the information you entered as the variable's value. The value is highlighted, as shown in Figure 3.47.

Figure 3.47 Click the Variable's Value to View or Edit Its Value



2 Click it a second time. The cursor becomes an I-beam cursor.

3 Edit its value.

Editing Table Variable Names

1 Double-click its name. Or, right-click (hold the CONTROL key and click on Macintosh) its name or value and select **Edit**. The window in Figure 3.46 appears.

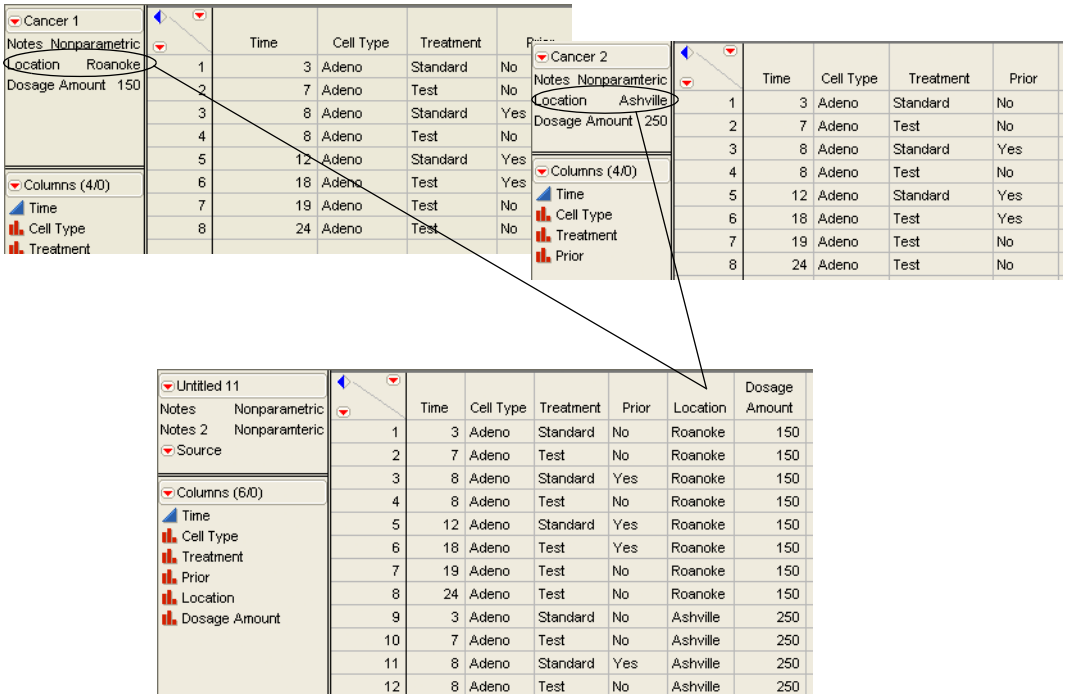
2 Edit its name.

To delete a table variable, right-click (hold the CONTROL key and click on Macintosh) its name or value and select **Delete**.

Example of Using a Table Variable

Table variables can be especially useful when you need to combine two or more data tables. For example, suppose two trials were conducted at two different hospitals. One of the trials' data is in a table called Cancer1.jmp, and the other is in Cancer2.jmp. To consolidate the data into one table, select **Tables > Concatenate**. (See "Concatenating Data Tables," p. 241, for details.) If you created table variables in Cancer1.jmp and Cancer2.jmp then those variables are also concatenated and appear as columns in the concatenated table, as shown in Figure 3.48.

Figure 3.48 The Data and Table Variables From Cancer1.jmp and Cancer2.jmp (Top Tables) Concatenated Into a Column in Untitled 11.jmp (Bottom Table)



Cancer 1
Notes Nonparametric
Location Roanoke
Dosage Amount 150
Columns (4/0)
Time
Cell Type
Treatment

	Time	Cell Type	Treatment	Prior
1	3	Adeno	Standard	No
2	7	Adeno	Test	No
3	8	Adeno	Standard	Yes
4	8	Adeno	Test	No
5	12	Adeno	Standard	Yes
6	18	Adeno	Test	Yes
7	19	Adeno	Test	No
8	24	Adeno	Test	No

Cancer 2
Notes Nonparamteric
Location Ashville
Dosage Amount 250
Columns (4/0)
Time
Cell Type
Treatment
Prior

	Time	Cell Type	Treatment	Prior
1	3	Adeno	Standard	No
2	7	Adeno	Test	No
3	8	Adeno	Standard	Yes
4	8	Adeno	Test	No
5	12	Adeno	Standard	Yes
6	18	Adeno	Test	Yes
7	19	Adeno	Test	No
8	24	Adeno	Test	No

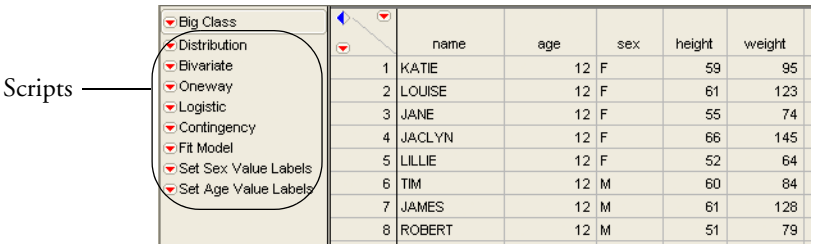
Untitled 11
Notes Nonparametric
Notes 2 Nonparamteric
Source
Columns (6/0)
Time
Cell Type
Treatment
Prior
Location
Dosage Amount

	Time	Cell Type	Treatment	Prior	Location	Dosage Amount
1	3	Adeno	Standard	No	Roanoke	150
2	7	Adeno	Test	No	Roanoke	150
3	8	Adeno	Standard	Yes	Roanoke	150
4	8	Adeno	Test	No	Roanoke	150
5	12	Adeno	Standard	Yes	Roanoke	150
6	18	Adeno	Test	Yes	Roanoke	150
7	19	Adeno	Test	No	Roanoke	150
8	24	Adeno	Test	No	Roanoke	150
9	3	Adeno	Standard	No	Ashville	250
10	7	Adeno	Test	No	Ashville	250
11	8	Adeno	Standard	Yes	Ashville	250
12	8	Adeno	Test	No	Ashville	250

Creating Scripts

You can create a JSL script to save with the data table (Figure 3.49). These scripts are used to automatically complete various tasks and analyses. For full explanations of scripts, see the *JMP Scripting Guide*.

Figure 3.49 Scripts Saved With the Data Table

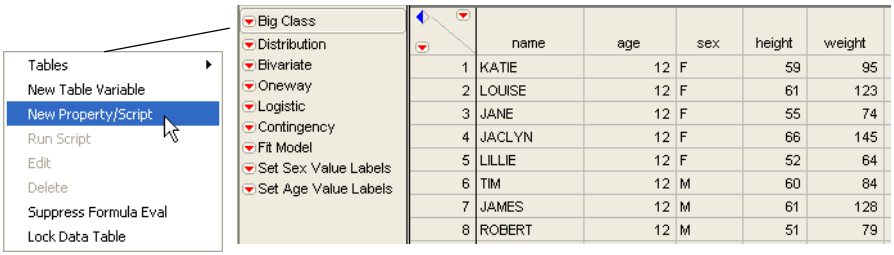


	name	age	sex	height	weight
1	KATIE	12	F	59	95
2	LOUISE	12	F	61	123
3	JANE	12	F	55	74
4	JACLYN	12	F	66	145
5	LILLIE	12	F	52	64
6	TIM	12	M	60	84
7	JAMES	12	M	61	128
8	ROBERT	12	M	51	79

Adding Scripts to Data Tables

1 Click the red triangle icon to the left of the data table name in the tables panel. (See Figure 3.50.)
2 Select **New Property/Script** from the drop-down menu.

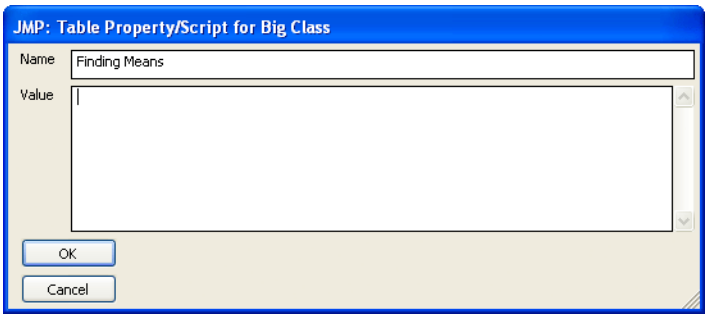
Figure 3.50 Creating a Script



3 Give the script a name by typing it into the box beside **Name**, as shown in Figure 3.51.

4 Give the script a value by typing JSL code into the box beside **Value**.

Figure 3.51 Naming and Defining the Script



Tip: If you want a particular script to run automatically every time the data table is opened, name the script **OnOpen**. Only one script saved in the data table can be set to run automatically.

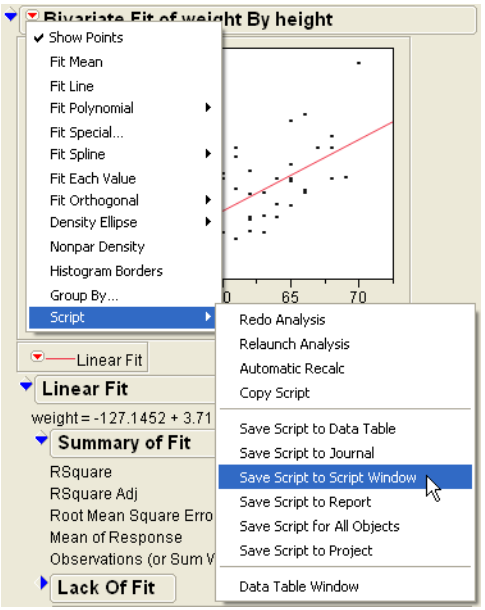
5 Click **OK**. The script appears in the tables panel.

Adding Scripts without Typing JSL Code

1 Run an analysis and create an output report using the steps you would like the script to duplicate.

2 Click the red triangle icon beside the report title name, as shown in Figure 3.52.

Figure 3.52 Click the Red Triangle



3 Select **Script > Save Script to Data Table**. The script is created and added to the tables panel.

Running Scripts

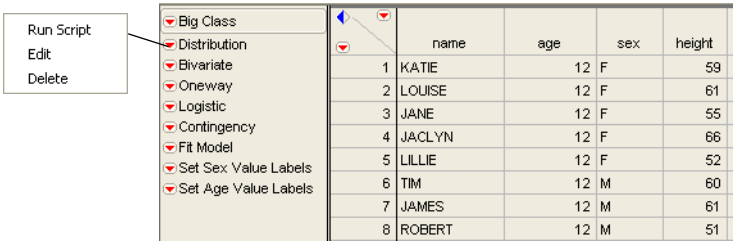
1 Click the red triangle icon beside the script's name.

2 From the menu, select **Run Script**.

Viewing or Editing Scripts

1 Double-click its name. Or, click the red triangle icon beside the script's name, as shown in Figure 3.53, and select **Edit**. The window in Figure 3.46 appears.

Figure 3.53 Click the Red Triangle



2 Edit its value.

Editing Script Names

1 Double-click its name. Or, click the red triangle icon beside the script's name, as shown in Figure 3.53, and select **Edit**. The window in Figure 3.46 appears.

2 Edit its name.

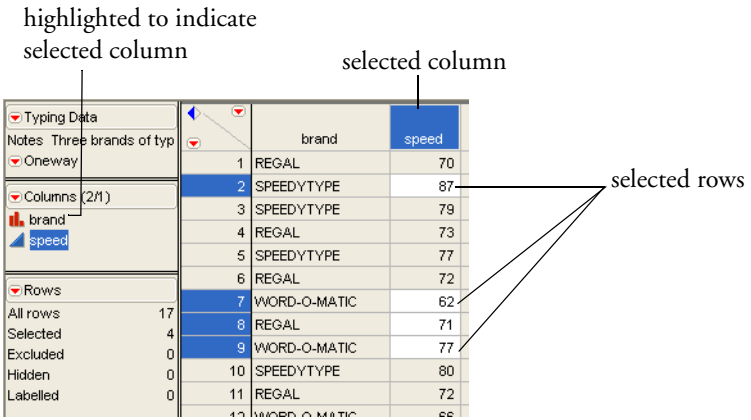
To delete a script

Click the red triangle icon beside the script's name or right-click (hold the CONTROL key and click on Macintosh) its name, as shown in Figure 3.47, and select **Delete**.

Selecting Rows and Columns

You can select rows, columns, or both rows and columns, as shown in Figure 3.54.

Figure 3.54 Example of Selected Rows and Columns



Use the instructions in Table 3.4 to select rows.

Table 3.4 Selecting Rows

Action	Instructions
Select an entire row	Click the empty space that contains the row number.
Select multiple rows	• Click and drag the cursor over the row number in the data grid. • Shift-click the first and last rows of the desired range. • To make a discontiguous selection, Ctrl-click (Windows/Linux) or Command-click (Macintosh) each row. These commands are also toggles that deselect previously selected rows.
Select/deselect all rows	Select **Rows > Row Selection > Select All Rows**. Or, Shift-click the lower triangular area in the upper left corner of the data grid to select. Click again to deselect all rows. To clear all highlights in the data table, press the Esc key on your keyboard.
Select a block of cells formed by the intersection of rows and columns	Drag the cross cursor diagonally across the cells.

Table 3.4 Selecting Rows

Action	Instructions
Select a certain row number	Select **Rows > Row Selection > Go to Row** and type in the desired row number.
Invert the row selection	Select **Rows > Row Selection > Invert Row Selection**.
Select random rows	Select **Rows > Row Selection > Select Randomly**. See "Randomly Selecting Rows," p. 95, for details.
Select the Pareto Frontier	Select **Rows > Row Selection > Select Dominant**. A window appears that lets you choose high or low values for the Pareto frontier selection
Save the current selection	Select **Rows > Row Selection > Name Selection in Column.** The current selection is saved in a new column.

Use the instructions in Table 3.5 to select columns.

Table 3.5 Selecting Columns

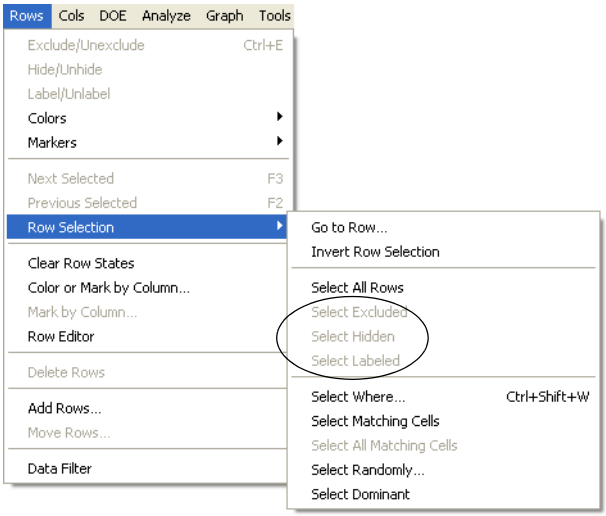
Action	Instructions
Select a column	• Click the empty space around the column name. • Click the column name in the column panel to the left of the data grid.
Select multiple columns	• Click and drag the cursor over the column name in the data grid. • Shift-click the first and last columns of the desired range. • To make a discontiguous selection, Ctrl-click (Windows/Linux) or Command-click (Macintosh) the desired columns. These commands are also toggles that deselect previously selected columns.
Extend a selection of columns	• Shift-click the first and last column of the desired range. • To make a discontiguous selection, Ctrl-click (Windows/Linux) or Command-click (Macintosh) the desired columns. These commands are also toggles that deselect previously selected columns.
To select/deselect all columns at once	Shift-click the upper triangular area in the upper left corner of the data grid to select. Click in the upper left corner to deselect all columns. To clear all highlights in the data table, press the Esc key on your keyboard.
Make a discontiguous selection	Ctrl-click (Windows/Linux) or Command-click (Macintosh) each column.
Select a block of cells formed by the intersection of rows and columns	Drag the cross cursor diagonally across the cells.

Selecting Excluded, Hidden, or Labeled Rows

Sometimes you need to automatically highlight, or select, certain types of rows so you can see or manipulate them among the many rows of a data table. To select rows that have been marked as excluded, hidden, or labeled:

1 Select **Rows > Row Selection** (Figure 3.55).

Figure 3.55 The Row Selection Menu



2 Select one of the following:

Select Excluded Selects all excluded rows regardless of their current selection status and deselects any other previously selected rows.

Select Hidden Selects all hidden rows regardless of their current selection status and deselects any other previously selected rows.

Select Labeled Selects all labeled rows regardless of their current selection status and deselects any other previously selected rows.

Selecting Cells with Specific Values

If you are looking for a specific value in a data table, there are several ways to quickly select it, as explained in the sections below.

Selecting Cells That Match the Currently Highlighted One

JMP can find all cells whose values are the same as the one(s) you currently have highlighted. You can do this within one data table or throughout all open data tables. To select cells that contain the same values as highlighted ones:

1 Highlight the cells that contain the value(s) you want to locate.

2 To find all matching cells within the active data table, select **Rows > Row Selection > Select Matching Cells**. Or, right-click (hold the CONTROL key and click on Macintosh) one of the highlighted row numbers and select **Select Matching Cells**.

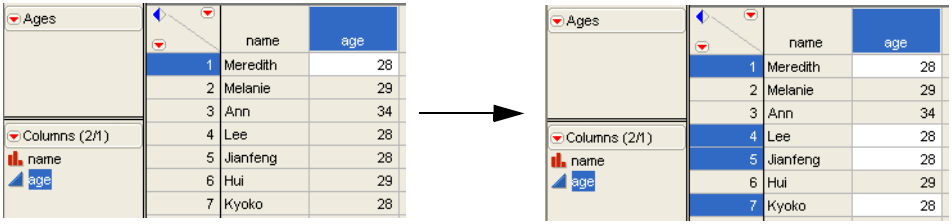
To find all matching cells across all open data tables, select **Select All Matching Cells**.

3 The row(s) that contain the same values as the highlighted ones will highlight.

4 For example, suppose you wanted to select all cells in the age column that contain the highlighted age **28** (on the left in Figure 3.56). You would select **Rows > Row Selection > Select Matching**

Cells, and the data table would appear, as shown on the right in Figure 3.56.

Figure 3.56 Select Rows Using the **Select Matching Cells** Window



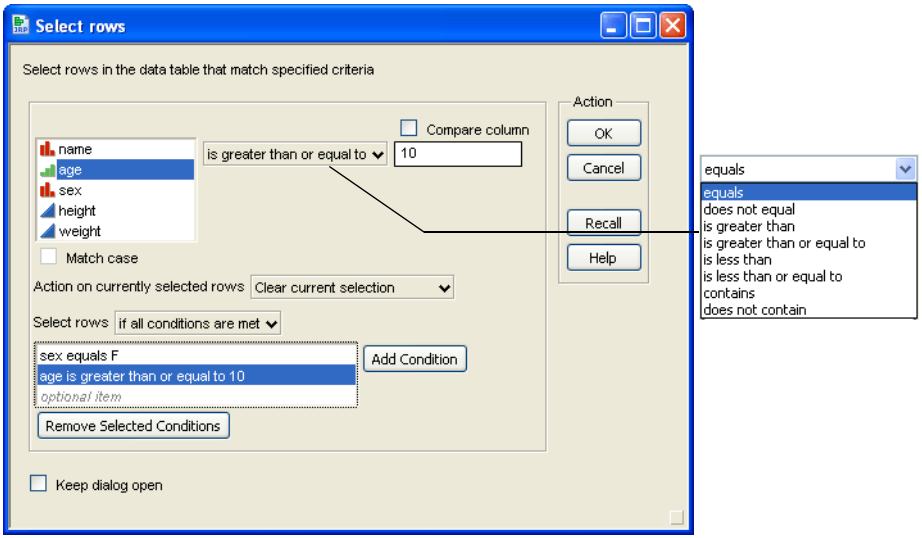
Selecting Cells That Contain Specific Values

JMP can search for a specific value (or text string) and highlight all cells in the data table containing that value.

To select cells that contain specific values:

1 Select **Rows > Row Selection > Select Where**. The window in Figure 3.57 appears.

Figure 3.57 Select Rows Using the **Select Where** Window



2 If you currently have rows selected in the data table, click an option under **Action on currently selected rows** to tell JMP how to handle that current selection:

Clear Current Selection Removes the highlight from currently selected rows and selects all rows that contain the specified value.

Extend Current Selection Keeps the currently selected rows selected and also selects the rows in which the specified value has been found.

Select From Current Selection Selects the rows in the currently selected array that contain the specified values.

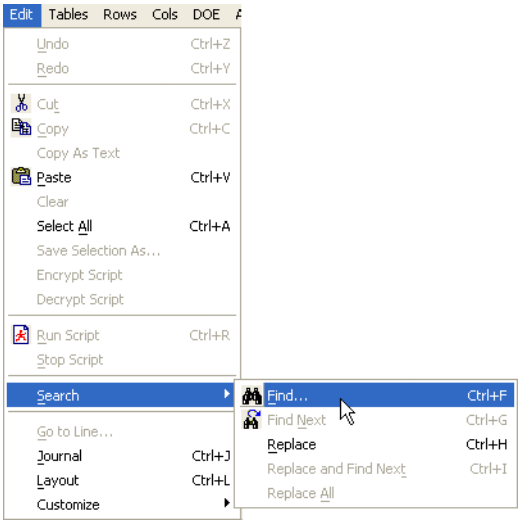
3 From the list, highlight the name of the column whose rows you want to select.
4 Use the drop-down menu to select a condition from the list (equals, does not equal, and so forth), as shown in Figure 3.57.
5 Type the value for which you want JMP to search. To search for missing values, leave the box empty.
6 (Optional) If you would like the search to be case-sensitive, click the box beside **Match Case**.
7 (Optional) If you would like to compare the values of two columns, click the **Compare column** check box. This reveals a list of columns for comparison.
8 Click **Add Condition**.
If you would like to add more conditions to the search, repeat steps 3-7, and click the appropriate item in the **Select Rows** area to specify if you would like JMP to select rows only if all conditions are met, or if any of the conditions are met.
9 If you want the window to stay open after the selection, click **Keep dialog open**.
10 Click **OK**.

Using the Search/Find Command

You can also select cells by selecting **Edit > Search**. To find (or find and replace) values:

1 Select **Edit > Search > Find**, as shown in Figure 3.58.

Figure 3.58 Search Choices



2 Enter a value in the **Find what** box. To find missing character values, leave the **Find** field empty and check **Match Whole Words Only**. See "Locking Tables," p. 83, for details.

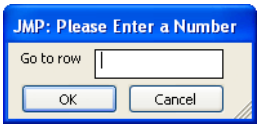
Selecting a Particular Row or Column

If you know the number of the row you want to highlight, instead of scrolling through many rows to find it, you can quickly find a row number using the **Go to Row** command.

To find a row:

1 Select **Rows > Row Selection > Go to Row**. The window in Figure 3.59 appears.

Figure 3.59 The Go to Row Window

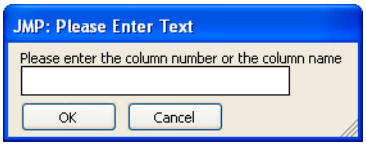


2 Enter the row number and click **OK**.

To find a column:

1 Select **Cols > Go to**. The window in Figure 3.60 appears.

Figure 3.60 The Go to Window



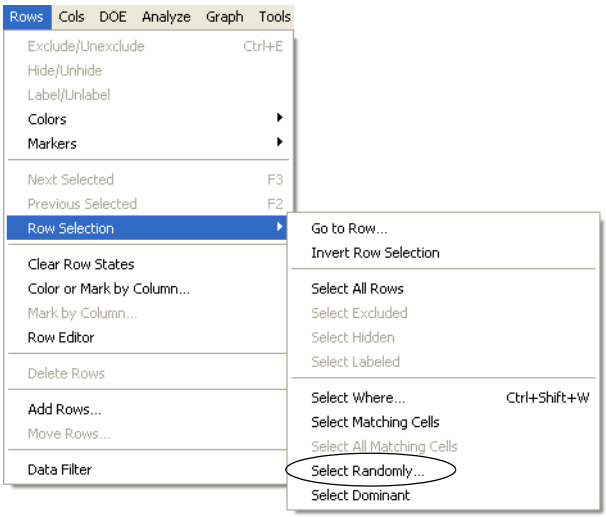
2 Enter the column number or name and click **OK**.

Randomly Selecting Rows

You can have JMP randomly select a specific number of rows or a percentage of the total rows:

1 Select **Rows > Row Selection > Select Randomly**, as shown in Figure 3.61. The window in Figure 3.62 appears.

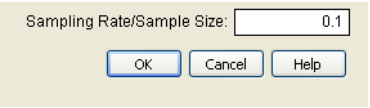
Figure 3.61 Selecting Randomly



2 To randomly select a specific number of rows, enter the absolute sample size in the text edit box.

Or, to randomly select a percentage of the total rows, enter the proportional sample size, as shown in Figure 3.62. If you enter a number less than one, JMP assumes that the number is a proportion and you want to randomly select that percentage of rows. If you enter a number more than one, it assumes that the number you entered is the number of rows you want randomly selected. For example, entering 10 randomly selects 10 rows. Entering 0.1 randomly selects 10% of the rows.

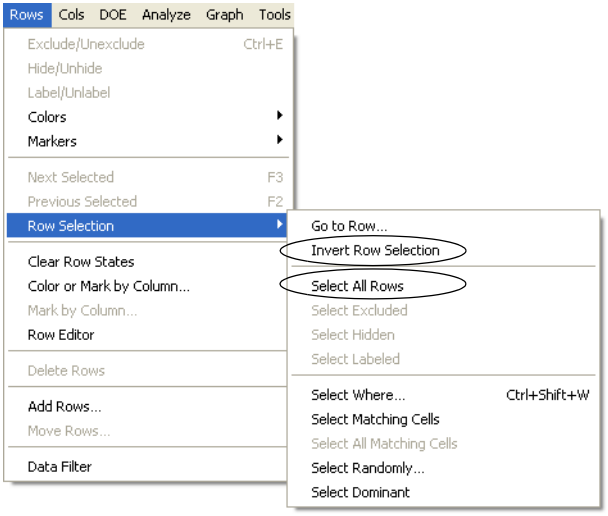
Figure 3.62 The Select Randomly Window



Inversely Selecting and Selecting All Rows

To select all rows in a JMP data table, select **Rows > Row Selection > Select All Rows**.

To deselect all selected rows and select all previously deselected rows, select **Rows > Invert Row Selection**.



Locating Next and Previously Selected Rows

You can locate the next selected row after the current row and cause it to flash by selecting **Rows > Next Selected**. Similarly, you can locate the previously selected row before the current row and cause it to flash by selecting **Rows > Previous Selected**.

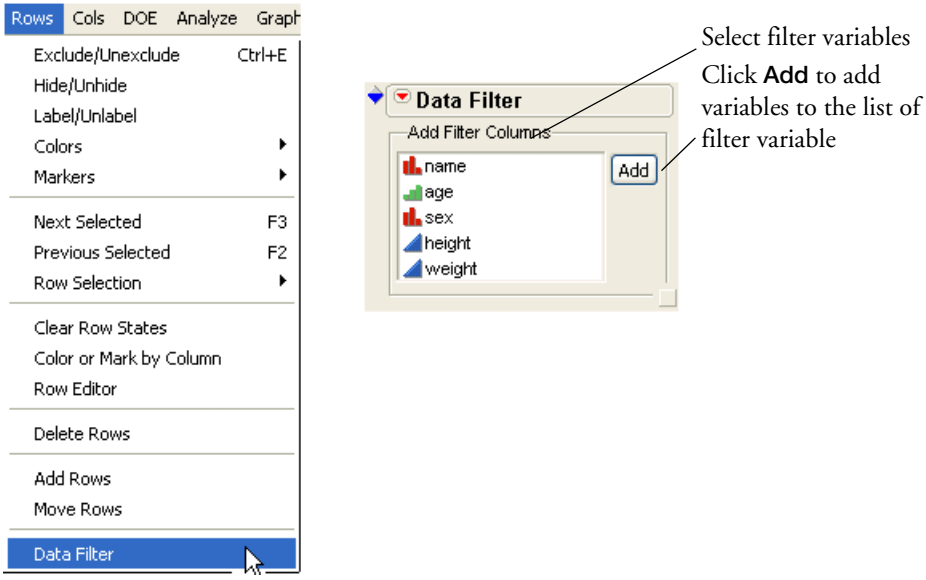
Each time you select **Rows > Next Selected** or **Rows > Previous Selected**, the next or previously selected row is found and flashes. A beep signals when the last selected row is located.

The Data Filter

The **Data Filter** command in the **Rows** menu gives a variety of ways to identify subsets of data Using Data Filter commands and options, you interactively select complex subsets of data, hide these subsets in plots, or exclude them from analyses.

When you choose **Rows** > **Data Filter**, the Data Filter window shown in Figure 3.63 appears. The initial Data Filter window shows the **Add Filter Columns** panel that lists all the variables in the current data table. You select columns in this list whose values you want to use as filters that identify subsets of data. You can open the **Add Filter Columns** panel and add more filter variables to the process at any time. (Figure 3.63).

Figure 3.63 Data Filter Window and Options

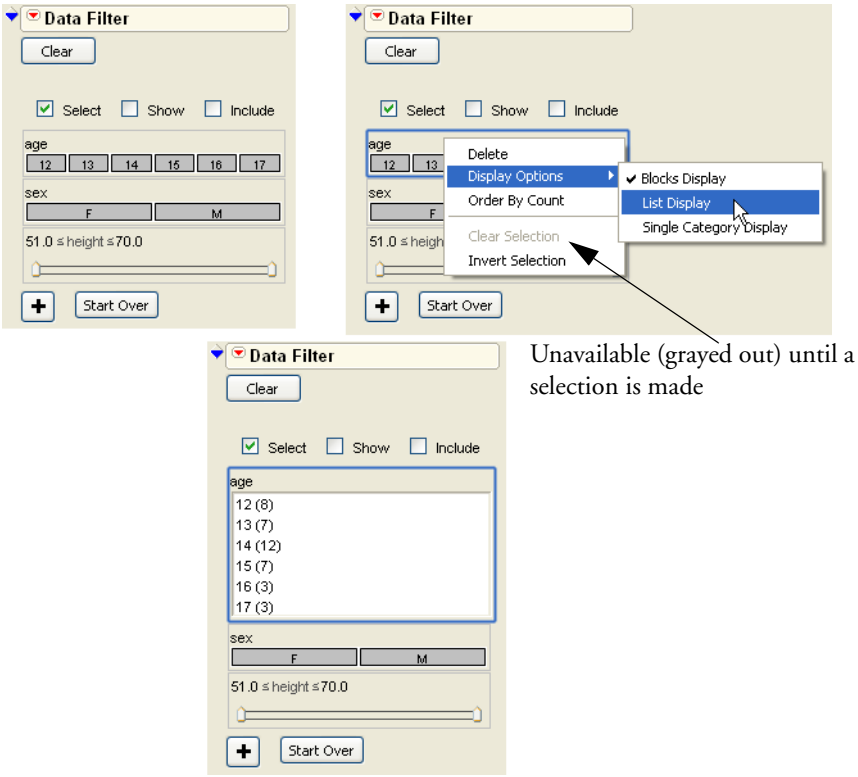


Data Filter Control Panel

To use the Data Filter, select one or more variables in the **Add Filter Columns** list whose values you want to use as filters and click **Add**. You now see the initial Data Filter control panel shown on the left in Figure 3.64.

- The values of the variables you chose are in boxes in the lower part of the panel.
- Above the variable are three check boxes that determine the display modes of the values you select.
- The **Clear** button at the top of the panel clears all selections you have made.
- the large plus button (+) at the bottom of the panel opens the Add Filter Columns list again at any time so that you can add variables to the filter process.
- The Start Over button (Start Over) removes all the filter columns.

Figure 3.64 Data Filter Control Panel



When you click in a variable box, it highlights. Right-click in a variable box (not on a value) to see the context menu, illustrated on the middle example of Figure 3.64. The menu command affects only the highlighted variable.

Nominal and ordinal variables have these commands:

Delete removes the variable from the Data Filter control panel.

Display Options which include the following:

Blocks Display shows each level as a proportional block.

List Display shows each level as a member of a list, followed by its frequency.

Single Category Display shows each level, followed by its frequency, in a menu.

Order by Count orders the variable values by frequency of occurrence whether the variable is shown as a bar of values or in list form.

Clear Selection clears any selection in effect for that variable only

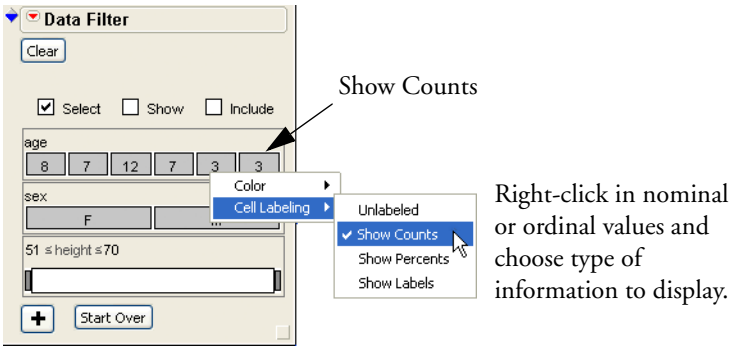
Invert Selection deselects any selected values, and selects all values previously not selected, for that variable only.

The context menu for continuous variables has the **Delete**, **Clear Selection**, and **Invert Selection** commands.

Note: You can select additional variables at any time in the Add Filter Columns list to use as filter columns. To remove a filter variable, click in the box that displays its values and press the Delete key on your keyboard, or right-click and select **Delete** from the menu that appears. If the Add Filter Columns list is not open and you want to add more variables, click the large plus button (+) to open it.

For nominal or ordinal variables with only a few categories, the category labels show by default. However, you can right-click any value and change the color of the categories as they are displayed in the data filter control panel. You can also select the cell labeling information that is shown for each level. Figure 3.65 illustrates changing the values in the age categories to be counts instead of age group level.

Figure 3.65 Right-click in Value of Nominal or Ordinal Value



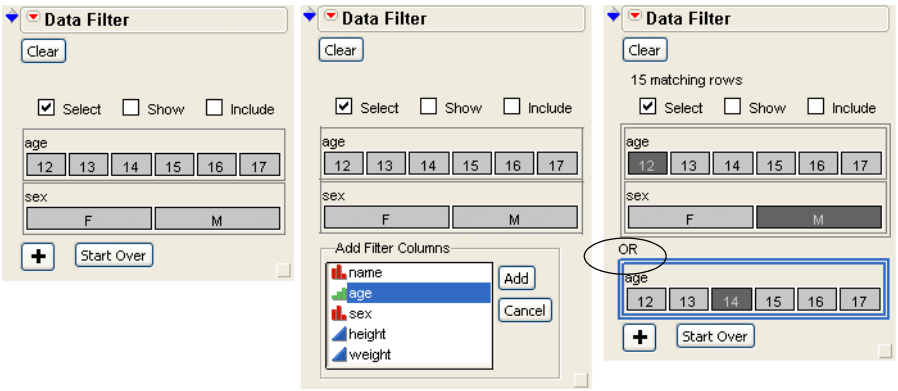
Adding Additional Groups of Variables to the Control Panel

You can form complex logical subsets by expanding the Data Filter control panel to include multiple groups of variables. If you press the Shift key when adding groups of variables, the selections you make in each group are selected with a logical OR. For example, the first control panel in Figure 3.66 shows the age and sex variables. To add age again as an OR variable,

- click the large plus (+) to reshow the Add Filter columns list
- highlight the age variable
- press the Shift key and click **Add**.

The age variable shows a second time in the control panel, with OR separating the two groups of variables. This example now selects of 12 year old males or 14 year old students of either sex.

Figure 3.66 Add Groups of Variables to the Control Panel



The next sections describe control panel check box modes (Select, Show, and Include) and menu options on the Data Filter title bar.

Check Box Modes

The Data Filter control panel has three check boxes, **Select**, **Show**, and **Include**. When you first use the Data Filter, the **Select** box is checked by default. The data filter operates without any check boxes in effect, or you can use any combination of check box modes:

Select The Select mode highlights the rows (observations) in the data table that correspond to the selection criteria you specify, as illustrated in Figure 3.67. The data selections are highlighted until you remove the checkmark from the **Select** check box.

Show the Show mode shows the rows you identified using the data filter in plots and charts. All other rows have the hidden row state characteristic assigned to them. The hidden row state icon (mask) appears for those rows in the data table. All points are included in the computations, analyses, and in reports, but only points that are not hidden show in most plots and graphs.

Include The Include mode Includes rows you identified using the data filter in statistical analysis. All other rows have the excluded row state assigned to them. The excluded row state icon appears next to the row number in the data table for these rows. Excluded rows are excluded from the computations, analyses, and reports

Showing, hiding, including or excluding data are row state properties, and are discussed in detail in the "Properties and Characteristics of Data" chapter.

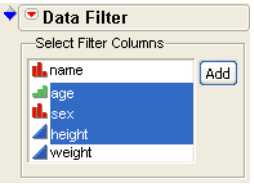
The options in the Data Filter window are active even if no check boxes are in effect. However, you must check at least one box to make you filter selections visible in the data table and in plots and charts.

Using Nominal or Ordinal Variables as Filter Columns

The example in Figure 3.67 reflects the Big Class.jmp data table from the Sample data library. When you select age, sex, and weight in the Data Filter window as filter variables and click **Add**, the window changes, as shown on the left in Figure 3.67. The values of the filter variable are discrete rectangles for

nominal and ordinal variables, and are displayed as a range bar for continuous variable. To see the results in Figure 3.67:

1 With the Big Class.jmp data table open, select **Rows** > **Data Filter**.



2 When the initial Data filter window appears, select age, sex, and weight in the **Select Filter Column** list. To select multiple variables, control-click (Windows and Linux) or command-click (Macintosh) age and sex and weight.

3 Click **Add** on the Data Filter window to see the variable values in the Data Filter window.

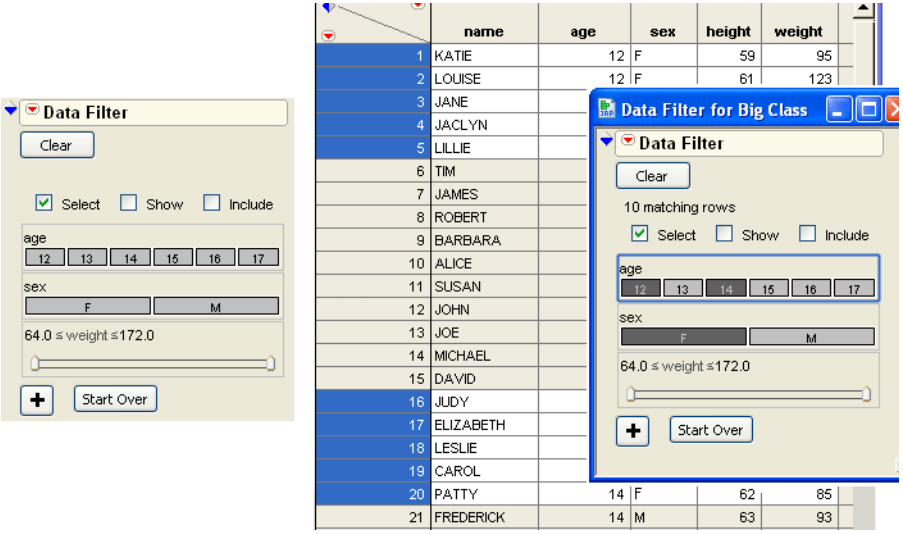
4 Click on the values in the Data Filter window to identify the rows you want the Data Filter to use. In this example, the **Select** box is checked, so the rows are selected in the data table. In Figure 3.67, 12 and 14 year old females are selected. To select discontiguous values, Ctrl-click (Windows and Linux) or Cmd-click (Macintosh) the values you want to use.

Notice that you can select any values in any of the character variables you chose to use in the Data Filter (or any of the numeric values, as well).

- To make a contiguous selection of character values of a single variable, Shift-click the values.
- To make a discontiguous selection of a single variable, Ctrl-click (Windows/Linux) or Cmd-click (Macintosh) each value you want.
- To continue selecting contiguous values of the same variable or another variable, shift click values.
- To continue selecting discontiguous values of another character variable, Ctrl-click (Windows/Linux) or Cmd-click (Macintosh) each value

Note: Clicking in a continuous variable bar does not deselect the character values you have in effect. Selecting continuous values is covered in the next section.

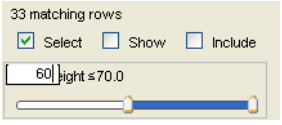
Figure 3.67 Select Columns as Data Filters



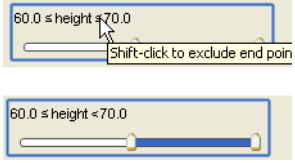
Selecting Continuous Values as Filters

The continuous variable, height, shows with a slider that spans the range of height values (Figure 3.67). There are several ways to identify filter values for a continuous variable.

- Drag across the slider bar. You can drag from either end of the slider bar. The selected height values are shown above the slider bar.
- Click anywhere in the empty (not selected) part of the slider to set the filter range at that point.
- You can also edit the values of weight in the text above the slider bar. Click in the value area to create a text box and enter the value you want.



By default, the range of values includes the endpoints (55≤ height ≤ 70). (Optional) You can change the sign of the inclusion statement above the bar to exclude either or both of the endpoints. To do this, shift click on either sign in the inclusion statement, as shown here.



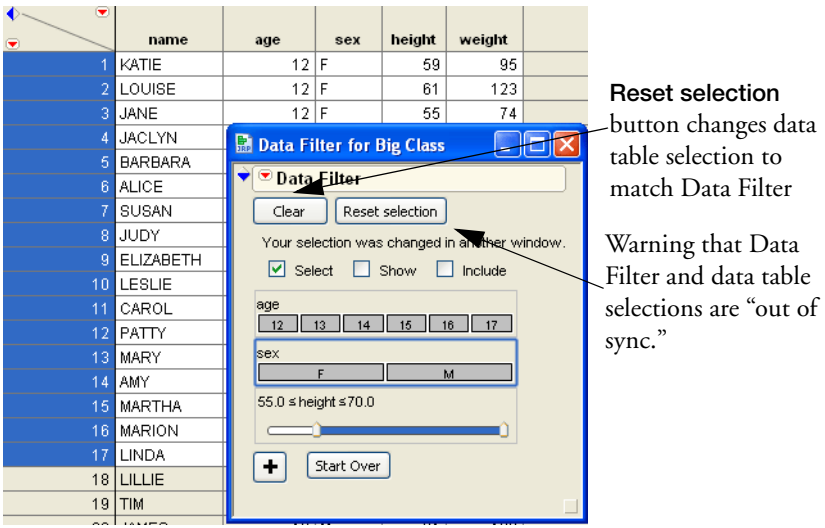
Note that the inclusion statement now reads 55 ≤ height < 70, (excluding the 70 endpoint).

The selection of a numeric range is persistent in that you can click anywhere else (a character value or another number bar) and the numeric selection is not affected. You must click within a numeric bar to change its selection.

Changing the Data Table After Making Data Filter Selections

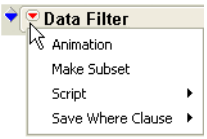
If you have identified a subset with the Data Filter and subsequently alter row states in the data table or select points in graph or plot, the selections in the Data Filter might not reflect the row state status of the data table. The data table and the Data Filter are then 'out of sync.' The Data Filter responds with a warning message and has an additional button as shown inFigure 3.68. The message warns you that "Your selection was changed in another window." When you click the **Reset Selection** button, the data table selections change and again reflect the selections in the Data Filter; the button no longer appears on the Data Filter panel.

Figure 3.68 Data Filter and Data Table Selections Are Different



Data Filter Menu Commands

The red triangle menu on the Data Filter title bar has special purpose commands for the Data Filter.

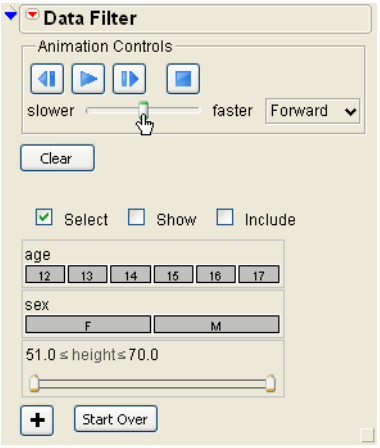


Animation

The animation feature given by the Data Filter causes a sequential highlighting of the values of a single variable. For example, if you have the Data Filter shown in Figure 3.69, then you can cause animation

of the values of age, sex, or height to occur. The individual values highlight in the data table, but patterns are more interesting if you first create a plot and then invoke the animation of a variable using the Data Filter to see how it behaves on the plot.

Figure 3.69 Animation Control Panel in the Data Filter



To use the animation feature, select **Animation** from the Data Filter menu to display the Animation control panel. Then click the first button on the Animation Control Panel to start the animation. When you start the animation feature, the values of the first variable in the Data Filter are alternately highlighted. The highlighted frame around the variable tells you which variable is selected for animation. To animate a different variable, click in the variable box you want. The animation cycles through the values of either character or numeric variables.

The Animation Control panel (Figure 3.69) has these controls:

- The middle button ( ) starts and stops the animation. After you start the animation cycles, the button changes to a stop button ( ). By default the animation begins with first value of the topmost variable.
- The backward arrow ( ) moves the animation backward one cycle. Click more than once to go backward more than one cycle. Then click the start button.
- The forward arrow ( ) moves the animation forward one cycle. Click more than once to go forward more than one cycle. Then click the start button.
- The square button ( ) hides the Animation Control section on the Data Filter Window. Select **Animate** from the menu on the Data Filter title bar again to see the Animation Control.

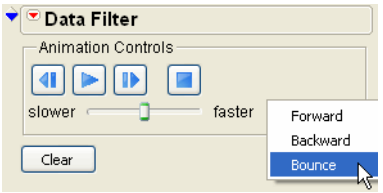
The Animate mode drop-down menu has these options.

Forward highlight values forward from first to last.

Backward highlight values from last to first.

Bounce highlight forward and then backward repeatedly.

Figure 3.70 Data Filter Animation Menu



To adjust the speed of the animation, move the slider to the left to make it slower or to the right to make it faster.

Make Subset

The **Make Subset** command performs similarly to **Tables** > **Subset**, but does not offer a window with subsetting options. When you choose **Make Subset**, JMP creates a new table with the selected columns in the active data table and the rows identified by the Data Filter. This is true even if you have manually selected additional rows or columns in the data table.

Script

The **Script** command performs the same as in other platforms. You can save the script, called **Data Filter**, to the data table, to a script window, to a journal, or copy it to the clipboard. The script opens the Data Filter window and lists all the variables you specified. This is particularly valuable for saving specifications of a complex subset of data. When you run the script, the Data Filter appears with the variables you selected with the selections you made.

Save WHERE Clause

Once you have identified the filter variable values to use, that information can be expressed as a JMP `WHERE` clause. The `WHERE` clause is used in JSL (JMP Scripting Language) programs to identify specific rows of data for processing or analysis. The Data Filter builds a `WHERE` clause based on the value selections you make. Figure 3.71 shows the options available in the Data Filter for saving a `WHERE` clause. and the `WHERE` clause that describes the values shown.

Clipboard creates a `WHERE` clause from the filter criteria and puts it on the clipboard.

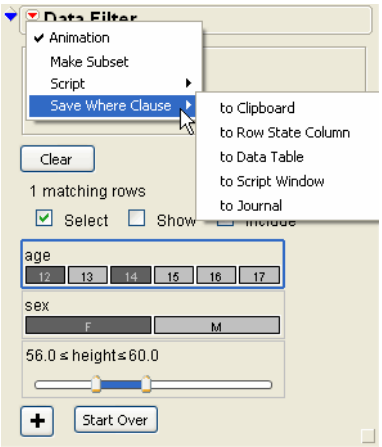
Row State Column creates a row state column in the data table that has a formula equivalent to the filter criteria.

Data Table creates a `WHERE` clause from the filter criteria and saves it as a JSL command with the current data table in a table property called **Filter**.

Script Window creates a `WHERE` clause from the filter criteria and appends it to the current script text window, or creates a new script if one does not exist already.

Journal creates the `WHERE` clause from the filter criteria and appends it to the current journal, or creates a new journal if one doesn't already exist.

Figure 3.71 Save WHERE Clause




```
Select Where(
  (:age == 12 | :age == 14)
  & :sex == "F" & :height >= 56
  & :height <= 60
);
```

Chapter 4

Saving Tables, Reports, and Sessions

Different Saving Methods

There are several ways to save your analyses in JMP. The way you choose depends on how you want to interact with your analyses in the future.

This chapter describes the ways you can save data tables and reports in JMP.

Contents

Saving Data Tables . . . 109
Saving .jmp Files for use in JMP 5.1.2 or Earlier . . . 109
Saving as a Text File . . . 110
Saving as a SAS Transport File . . . 111
Saving as a SAS Data Set (Windows Only) . . . 112
Saving as a Microsoft Excel File (Windows and Macintosh Only) . . . 112
Saving Data Tables to a Database . . . 113
Saving Reports . . . 114
Saving Using the Journal Command . . . 116
Saving Using the Layout Command . . . 118
Saving Parts of a Report in a Graphic Format . . . 121
Pasting Reports into Another Program . . . 122
Saving JMP Sessions . . . 122
Saving Sessions Upon Exiting . . . 122
Saving Sessions Manually . . . 123
Working with JMP Projects (Windows Only) . . . 124
Creating a JMP Project . . . 124
Saving and Closing a JMP Project . . . 125
Opening a JMP Project . . . 126
Adding Items to a JMP Project . . . 126
Customizing the Project . . . 127
Saving a Log Window . . . 128
Specifying Where to Save Files (Windows Only) . . . 128

Saving Data Tables

JMP saves data tables in the formats listed below.

To save data tables:

- On Windows and Linux, select **File > Save As** to save in multiple formats.
- On the Macintosh, select **File > Save As** to save as a JMP file (.jmp) and **File > Export** to save in Text (.dat), Microsoft Excel (.xls), and SAS Transport (.xpt) formats.

In addition to these file types, JMP can save files for types that have a corresponding ODBC driver. See "Saving Data Tables to a Database," p. 113, for details.

Table 4.1 File Types and Extensions

File Type(s)	Extension	OS Availability
JMP Data Table	.jmp	All
SAS Transport File	.xpt	All
JMP Report	.jrp	All
JMP Journal	.jrl	All
Excel File	.xls	Windows and Macintosh
Text File	.txt	Windows and Linux
SAS Version 7 Data Set	.sas7bdat	Windows
MS Access Database, CBA_EH_DB, CBA_TL_DB	.mdb	Windows
dBASE File	.dbf, .ndx, .mdx	Windows
Text File	.dat	Macintosh
OpenOffice Spreadsheet	.sxc	Linux

The maximum length of the data table's name depends on your computer's operating system.

Saving .jmp Files for use in JMP 5.1.2 or Earlier

JMP 8 uses the Unicode character set, which supports special characters such as é and ½. You can save data tables (.jmp) from JMP so that they can be opened in older applications that do not support Unicode (such as JMP 5.1.2 and earlier). This works if all of the data table's character data is all convertible to a legacy character set that the application can read.

There are two ways to do this:

- One way to use options in the Save As window. In Windows, place a check in the **Use JMP V5 Format (No Unicode)** check box that appears when you select **File > Save As**. For Macintosh, the check box is **JMP 5 Compatible (without Unicode text)**. For Linux, the check box is **Save Files in JMP v5.x Format**. The file is then saved without Unicode text.
- Another way to save tables so they can be opened by earlier versions of JMP is to disable the Unicode feature using preferences:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **General** category.

3 Uncheck the box beside **Save Text Files as Unicode**. Your text files will now be saved as plain (legacy) text.

Saving as a Text File

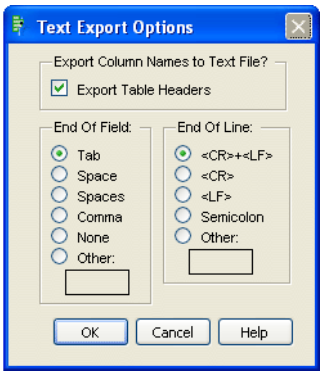
JMP can convert data from a JMP data table to standard text format with rows and columns.

To save a data table as a text file, follow the steps in the table below based on the operating system you are using and how you want to save the file.

Table 4.2 Saving a Data Table as a Text File

	Saving as a Text File
Windows	1 Select **File > Save As**. 2 Type a name for the file in the **File name** box. 3 Select **Text Export File (*.txt)** from the **Save as type** drop-down menu. 4 Click the **Options** button and specify end-of-line and end-of-field characters and detail the exportation of column names. If you want to save the file with no delimiters, select **None** in the **End of Field** box. See Figure 4.1 for details. 5 Click **OK**. 6 Click **Save**.
Macintosh	1 Select **File > Export**. 2 From the window that appears, select **Text** and click **Next**. 3 Type a name for the file in the **Save As** box. 4 Click **Export**.
Linux	1 Select **File > Save As**. 2 From the **Save as type** field, select ***.txt (Delimited Text)**. 3 Type a name for the file in the **File Name** box. 4 Click **Next**. 5 Specify end-of-line and end-of-field characters and detail the exportation of column names. See Figure 4.1 for details. 6 Click **Finish**.

Figure 4.1 Text Formatting Options on Windows and Linux



Text formatting options are:

- **Export Column Names to Text File** To have column names as the first record of the text file and labels or header information to be saved with the data, select **Export Table Headers.**
- **End of Field** Click the box beside the character found in the text file that serves as the delimiter signifying the end of a field. Click the box beside **Other** and enter a character if the appropriate character is not listed.
- **End of Line** Click the box beside the character found in the text file that serves as the delimiter signifying the end of a line (row). Click the box beside **Other** and enter a character if the appropriate character is not listed.

Note: If double-quotes are encountered when importing text data, the delimiter rules change and JMP looks for an end double-quote. Other text delimiters, including spaces embedded within the quotes, are ignored and treated as part of the text string.

Saving as a SAS Transport File

You can save a JMP data table in SAS transport file format or append a data table to an existing SAS Transport document.

Using Windows and Linux

1 Select **File > Save As.**
2 Type a name for your file in the **File Name** box. Note that the maximum length of a data table name depends on the operating system you are using.
3 Select the .xpt file extension (**SAS Transport Files**) from the **Save as type** drop-down menu.

To append the data table to an existing SAS transport library, click the box next to **Append To**, and highlight the file to which you want to append.

4 Click **Save**.

Using Macintosh

1 Select **File > Export.**
2 To create a new SAS transport file, select **SAS Transport**.
3 Click **Next**.
4 Type a name for the file in the **Save As** box. Note that the maximum length of a data table name depends on the operating system you are using.
5 Click **Export**.
6 To append the data table to an existing SAS transport library, select **SAS Transport** and check the box beside **Append**.
7 Click **Next**.
8 Highlight the file to which you want to append.
9 Click **Append**.

Saving as a SAS Data Set (Windows Only)

On Windows, JMP can save data tables as SAS version 6 and higher data sets. It writes columns as SAS variables and writes rows as SAS observations. It saves them in a format that SAS recognizes.

To save a data table as a data set:

1 Select **File > Save As.**
2 Type a name for your file in the **File Name** box. Note that the maximum length of a data table name depends on the operating system you are using.
3 Select **SAS Data Set** from the **Save as type** drop-down menu.
4 (Optional) If you want to save the file using SAS version 6 format (.sd2), click the box next to **Use SAS V6 Format (.sd2)**. If you're using SAS version 7 or higher, don't click this.
5 (Optional) If you want to save SAS variable names or SAS formats, click the **Preserve SAS variable names** or **Preserve SAS formats** check boxes.
6 Click **Save**.

Note: When you are exporting data to a SAS file, JMP date columns become SAS date values with the appropriate SAS format.

SAS Variable Names and Formats

After opening a SAS data set in JMP, you have the option of saving SAS variable names and formats when you save the file as SAS data again.

1 Select **File > Save As**.
2 In the Save as type menu, select **SAS Data Set**.
   At the bottom of the Save JMP File As window, three options appear:
   - **Use SAS V6 Format (.sd2)**
   - **Preserve SAS variable names**
   - **Preserve SAS formats**

   The **Preserve SAS formats** is selected by default.
3 To save SAS variable names as well, select the **Preserve SAS variable names** option.

Saving as a Microsoft Excel File (Windows and Macintosh Only)

You can save a JMP data table in Microsoft Excel workbook format.

Using Windows

1 Select **File > Save As.**
2 Type a name for your file in the **File Name** box. Note that the maximum length of a data table name depends on the operating system you are using.
3 Select the .xls file extension (**Excel Files**) from the **Save as type** drop-down menu.

Using Macintosh

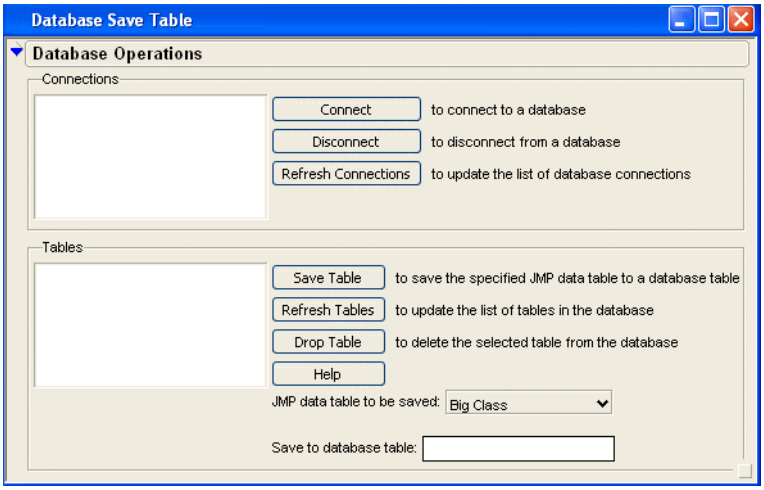
1 Select **File > Export.**
2 Select **Excel**.
3 Click **Next**.
4 Type a name for the file in the **Save As** box. Note that the maximum length of a data table name depends on the operating system you are using.
5 Click **Export**.

Saving Data Tables to a Database

You can save a data table to any database on your system that has a compliant ODBC (Open DataBase Connectivity) driver:

1 Select **File > Database > Save Table**. Figure 4.2 shows the window initially displayed.

Figure 4.2 The Database Save Table Window

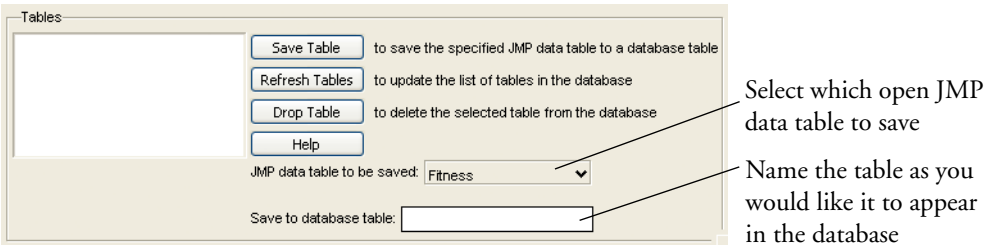


2 In the Connections box, highlight the name of the database to which you want to save the file. The Connections box contains a list of databases to which your system is connected (Figure 4.3).

If you are *not* connected to the needed database, create it by using another application, or see "Adding a new database connection," p. 114.

3 Click the drop-down menu beside **JMP data table to be saved**, as shown in Figure 4.3, and select which open JMP data table you want to save to the database.

Figure 4.3 Specify Which Table to Save


Tables
Save Table
to save the specified JMP data table to a database table
Refresh Tables
to update the list of tables in the database
Drop Table
to delete the selected table from the database
Help
JMP data table to be saved:
Fitness
Save to database table:
Select which open JMP data table to save
Name the table as you would like it to appear in the database

4 In the box beside **Save to database table**, type the name you want the table to have when you save it in the database.

5 Click **Save Table**.

Adding a new database connection

1 Click **Connect**.

2 Select the data source you want and click **OK**. Or, to create a new source, click the **New** button (Windows and Linux) or **Add** button (Macintosh).

Depending on which data source you select (and which database drivers you have installed on your computer), you might be presented with a variety of windows. Use them to create the database source.

3 Select the database to which you want to save the file.

Saving Reports

JMP saves reports in the formats listed in the table below.

To save reports:

- On Windows and Linux, select **File > Save As** to save in multiple formats.
- On the Macintosh, select **File > Save As** to save as a JMP report (.jrp) and **File > Export** to save in Text (.txt), HTML (.html), and Rich Text (.rtf) formats.

Table 4.3 Report File Types and Extensions

File Type	Extension	Description	OS Availability
JMP Report	.jrp	Analysis report originally created in JMP. It can be reopened for continued analysis.	All
Hypertext Markup Language	.htm, .html	Browser format; marked up text and references to separate picture files.	All

Table 4.3 Report File Types and Extensions *(Continued)*

File Type	Extension	Description	OS Availability
Rich Text Format	.rtf	Word processing format; mixture of pictures, text, and tables.	All
JMP Journal	.jrn	Analysis report duplicated in a separate window titled Journal. You can edit it or append other reports to it. Note that on Macintosh and Linux, select **Edit > Journal**, and then **File > Save**. On Windows, choose **File > Save**, and then choose the journal format.	All
Text Format	.txt	Plain text format; no pictures.	Windows and Macintosh
CompuServe Graphics Interchange Format	.gif	Compressed bitmap pictures.	Windows
Portable Network Graphics	.png	Compressed bitmap pictures; successor to GIF.	Windows
Joint Photographics Expert Group	.jpg	Compressed bitmap pictures; standard for photographs.	Windows
Scalable Vector Graphic	.svg	Pictures stored as text; best used for two-dimensional graphics.	Windows
Windows Metafile	.wmf	Pictures stored as commands; resolution independent.	Windows
Microsoft Word	.doc	Word processing format; mixture of pictures, text, and tables.	Windows (You must have Microsoft Word 2000 or later installed.)

Note: When saving as .html or .rtf in Windows and Linux, there are options at the bottom of the window (Windows) and after clicking the Next button (Linux) that let you select a graphics file format. Select the format you want JMP to save graphics in within the .html or .rtf file.

Saving Using the Journal Command

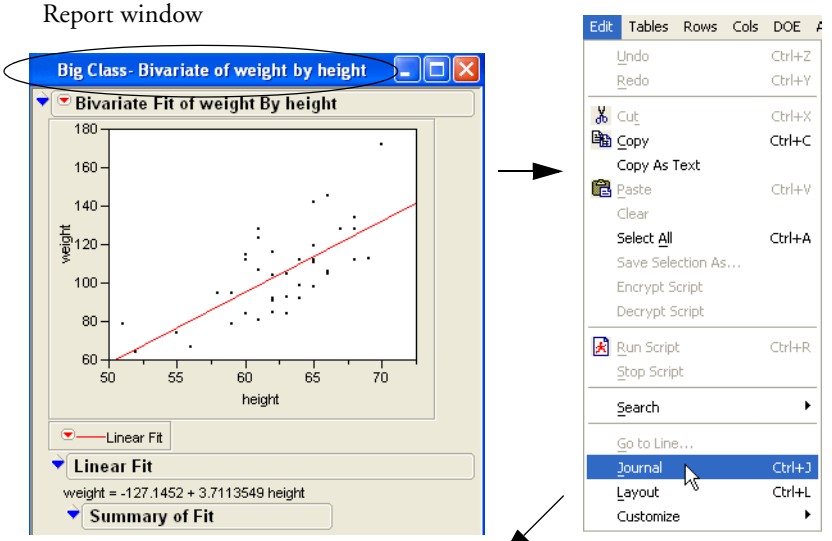
You can save a report for future editing by creating a journal from a report window. The report is duplicated in a separate window titled Journal, and you can edit it or append other reports to it.

Using Windows or Linux

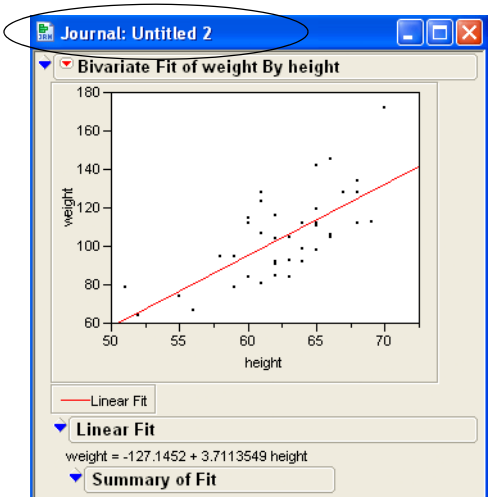
To create a journal and save it:

1 Select **Edit > Journal**. The report window is duplicated in a separate window titled Journal.

Report window



Journal window



2 Select **File > Save As**.

3 Save it in .jrn format.

See Table 4.3 "Report File Types and Extensions," p. 114 for other save options. You cannot save a journal as a report, but all other options are available.

You can also add elements to the journal. See "Appending Reports to a Journal," p. 117, and "Customizing JMP Journals," p. 118, for details.

Alternately, you can use the **File >Save As** command on Windows to save a report as a journal without creating a separate Journal window.

Using Macintosh

To export a journal to Text (.txt), HTML (.html), and Rich Text (.rtf) formats:

1 Select **File > Export**.
2 From the window that appears, select the appropriate radio button (Text, HTML, or Rich Text).
3 Click **Next**.
4 Type a name for the file in the **Save As** box.
5 Click **Export**.

Appending Reports to a Journal

To append other reports to a report you journaled, select **Edit > Journal** again. If an area of an analysis window is selected, **Edit > Journal** saves only the selected area instead of the entire window. See "Customizing JMP Journals," p. 118, for details.

When manipulating the report, remember that:

- The journal window has the same functions as the report window: you can click icons, click and drag, and right-click to access menus.
- When a report is journaled, the journaled copy is no longer connected to the data table.

To insert a page break for printing purposes, right-click the disclosure button (on Windows/Linux and ▶▼ on the Macintosh) in the journal window and select **Edit > Page Break**.

Note: If you create a journal file for one report (or data table) then open another report and journal it, the second report is added to the end of the first report in the journal. To create separate journals for separate reports, save and close the first journal before creating the second. Or, place separate reports in separate layout windows by using the Layout command, as described in "Saving Using the Layout Command," p. 118.

To save only a selected area of a report or data table to a journal:

1 Click the selection tool ( ).
2 Click and drag to select items in a report or data table, or Shift-click to select discontinuous items.
3 Select **Edit > Journal**. Or, if you already have a journal window open, click and drag the selected item from the report into the journal window.
4 Select **File > Save As**.

Customizing JMP Journals

The reports in the journal window look like the live analysis, but they are disconnected from the data, and analysis commands are no longer available. However, you can still customize the appearance of the journal just as you would do with a live analysis. When a JMP journal is open, you can:

- Print the contents of the journal window by selecting **File > Print**.
- Add notes to the end of the journal by double-clicking the open area at the bottom.
- Add file references, hyperlinks, and more. See "Creating Journals," p. 38, for details.
- Click the disclosure buttons (on Windows/Linux and on the Macintosh) to open and close report outline levels.
- Resize plots and graphs. (See "Resizing Plots and Graphs," p. 195.)
- Select and move any element of the report by copying and pasting or dragging and dropping.
- Right-click (hold the CONTROL key and click on Macintosh) plots and graphs and assign markers, change marker size, change background color, and more.
- Tailor plot axes with the Axis Specification window or by dragging them. (See "Customizing Axes and Axis Labels," p. 200.)
- Select and delete any report element.
- Use the annotate tool and other draw tools. (See "Adding Elements to a Report," p. 211.)
- Copy or drag individual graphs and text reports from a JMP analysis window and paste or drop them in a journal window.
- Copy or drag text and pictures from other applications and paste or drop them in a graph or at the end of a journal window. (See "Adding Graphics (Windows and Macintosh Only)," p. 216.)
- Rerun an analysis from the journal window by clicking the red triangle icon and selecting **Rerun in new window**.

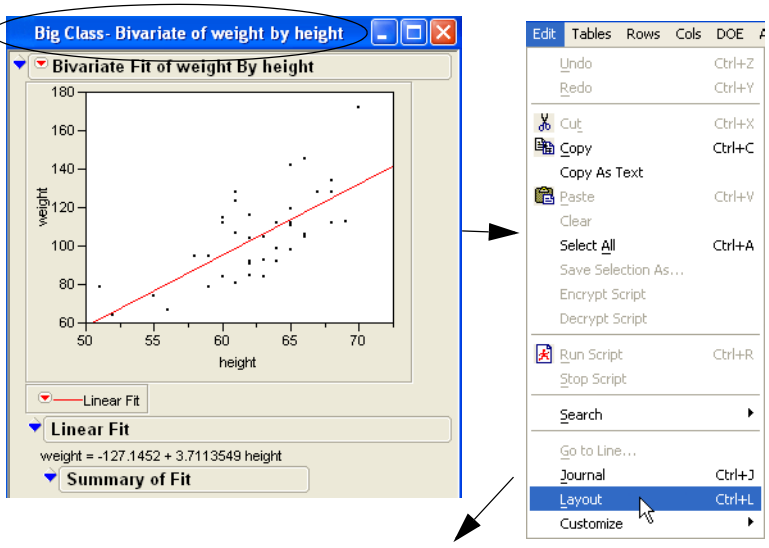
Saving Using the Layout Command

You can edit or manipulate the report before you save, enabling you to combine several reports into one or rearrange the report elements. You do this by selecting **Edit > Layout**. Using this command is different from using the **Edit > Journal** command because the Layout command provides additional options that let you ungroup parts of a report and restructure it to best fit your needs.

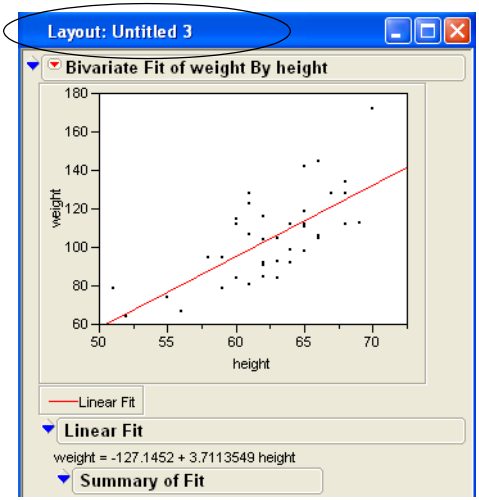
To create a layout:

1 Select **Edit > Layout**. The report window is duplicated in a separate window titled Layout.

Report window



Layout window



2 The **Layout** menu now becomes visible. It is located between the **Edit** menu and the **Tables** menu in the main menu bar, as shown in Figure 4.4. Items in the Layout menu are available only when you have selected an item using the arrow tool. See "The Layout Menu," p. 451, for details.

Figure 4.4 The Layout Menu

3 Click inside the layout window. The entire report becomes highlighted.

4 Select **Layout > Ungroup**, or right-click (hold the CONTROL key and click on Macintosh) inside the report and select **Ungroup**. This performs the first stage of ungrouping report elements, which ungroups (or disconnects) the topmost title bar from its reports and subreports. Each time you ungroup a report outline level title from its reports, the disclosure button (on Windows/Linux and ▶ ▼ on the Macintosh) for that level disappears and you can no longer close it. However, you can do many of the surface operations available, use the context menu in plots, tailor axes, rerun the analysis in a new window, edit scripts, and so on.

5 Select **Layout > Ungroup** again to ungroup the next level of the report outline. Note that only selected items are ungrouped.

6 Continue to select specific report elements (or all elements) and ungroup them until each title and each piece of a report or plot is an object.

Note: You can ungroup a report from its title bar and ungroup all its major pieces, but you cannot ungroup a column in a report table from its column heading.

---

7 Click an object to select it and move it anywhere in the layout window. The layout window has as many pages as you want, outlined with gray boundary lines.

8 Select **File > Save As**. JMP saves the file as a journal file (.jrn).

Use the table below to take further actions in a layout window.

Table 4.4 Working in a Layout Window

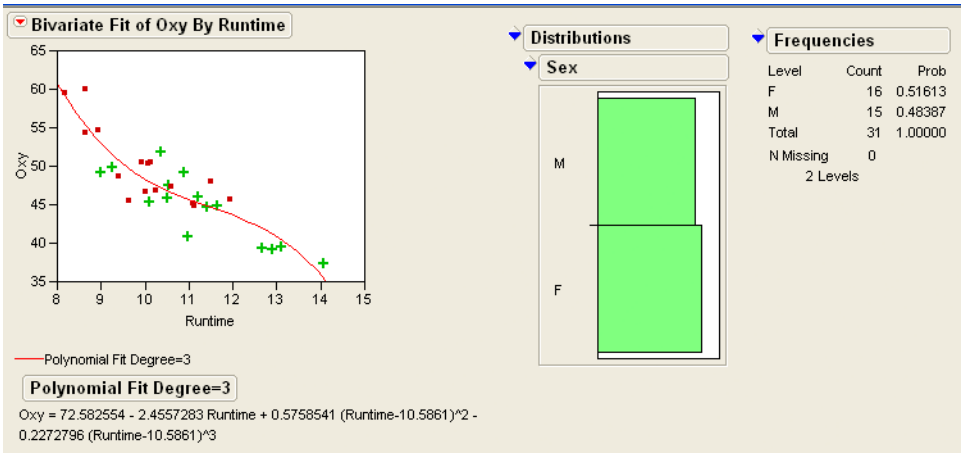
Action	Instructions
Edit a title bar	Double-click the title bar or report table column heading.
Quickly ungroup a layout to its smallest objects	Repeatedly press Ctrl-U (Command-U on the Macintosh).
Rerun the report in a new window	Click the red triangle icon on the title bar and select **Rerun in new window** from the menu.
Edit a script	Click the red triangle icon on the title bar and select **Edit Script** from the menu.
Access Layout menu items (on the main menu bar)	Select the arrow cursor.
Insert a page break	Right-click a disclosure button (on Windows/Linux and ▶ ▼ on the Macintosh) on the title bar and select **Display Box > Page Break**.

Table 4.4 Working in a Layout Window

Action	Instructions
Select and deselect items	Right-click a disclosure button (on Windows/Linux and on the Macintosh) on the title bar and select **Display Box > Select** or **Display Box > Deselect**.

The example in Figure 4.5 shows results extracted, combined, and organized in a compact form from a bivariate analysis (scatterplot and polynomial fit), a distribution analysis (histogram and frequency count), and a one-way analysis (means and *t*-test). The result gives a neat-looking summary of oxygen uptake as a function of run time in an exercise experiment. This was done by forming a layout window for one analysis, and then dragging the other desired analysis elements into the layout window, arranging the desired pieces, and deleting unwanted elements.

Figure 4.5 Multiple Analysis Results in a Layout Window



Saving Parts of a Report in a Graphic Format

You can save part of an analysis report window as a graphic. Although you will not be able to manipulate or customize the report before saving it, you can quickly save highlighted selections. On Windows, you can save the selection in .png, .jpg, .wmf, .gif, and .svg formats. On the Macintosh, you can save the selection in .png format.

To save a selection:

1 Click the selection tool ( ).
2 Highlight the area you want to save.
3 Select **Edit > Save Selection As** (Windows/Linux) or press the Command key and select **File > Export** (Macintosh).

Select the graphics file format to which you want to save the selection.

Note: Right-click the selection and choose **Copy**, and then paste the selection into another part of JMP or another software program. (See "Pasting Reports into Another Program," p. 122.)

Pasting Reports into Another Program

When you need JMP reports or data tables for use in another program, you can save the reports or tables by copying and pasting, or dragging and dropping, parts of it into another program, such as Microsoft Word or PowerPoint. Then, save the document in that application. Note that on Linux, you can copy and paste (or drag and drop) text but not graphics.

1 Click the selection tool ( ).
2 Click and drag (or Shift-click) to select items in a report window or data table. Clicking near the edge of the report window selects the entire report.
3 Click the selected items and drag them from JMP to the other program. Or, copy the selected items in JMP and paste them into the other program. When you paste an element into another application, the format used depends on the application into which you paste. If the application has a **Paste Special** command and you use it, you can select a format to use, such as text (.rtf), unformatted text (.txt), picture or Windows metafile (.wmf), bitmap (.bmp), or enhanced picture (.emf).

Note: To copy all text (no graphs) from the active report window as unformatted text, select **Edit > Copy As Text**. On the Macintosh, press the Shift key and select **Edit > Copy As Text**. To copy only the graph (no text), right-click the graph and select **Edit > Copy Picture**.

Saving JMP Sessions

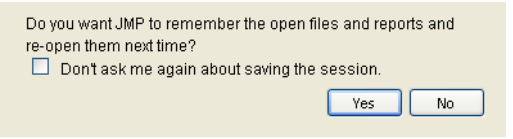
Each time you use JMP is called a *session*. A *saved session* is a JSL script that will re-open documents and re-run analyses to restore JMP its state when the session script was saved. A saved session can help get you back to a previous state without having to manually re-open files and re-run analyses.

If you are an advanced user, it is important to understand what session information is preserved in a saved session. Any documents (such as data tables, scripts, and journals) that have been saved are re-opened, and any windows that support script saving will be re-run (equivalent to clicking the red triangle in a report and selecting **Script > Redo Analysis**). Side effects of running scripts, such as global variable values or custom windows, will not be saved, and the state of highly interactive analyses will not be saved.

Saving Sessions Upon Exiting

The most common use of saved sessions is to save the state when JMP exits so it can be restored when JMP restarts. By default, JMP asks if you would like to save the state of your session each time you exit the program (Figure 4.6). This enables you to quit JMP, and then return to it later without having to open the files with which you were previously working.

Figure 4.6 Saving Session Upon Exiting


Do you want JMP to remember the open files and reports and re-open them next time?
Don't ask me again about saving the session.
Yes
No

To always save the session upon exiting, or to never save the session upon exiting, check the box beside **Don't ask me again about saving the session** and click **Yes** or **No**. You can change this option later in Preferences:

1 Choose **File > Preferences**.
2 Select the **Reports** icon.
3 Next to the **Save the Session When Exiting** option, choose to always save the session, never save the session, or have JMP ask if you would like to save upon exiting.

Saving Sessions Manually

You can also save a session to a location of your choosing and continue working, so you can restore the saved state whenever you like. Manually saving sessions is useful when you want more control of session saving and restoring, especially when you want to maintain multiple independent session states, each with a different sets of files and analyses.

To create scripts of JMP sessions:

1 Select **File > Save Session Script**.
2 Type the name of your script into the window and click **Save**.

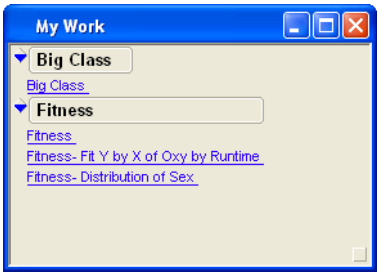
Another way of manually saving a session is by creating a journal of each session. (See "Saving Using the Journal Command," p. 116, and "Importing Data," p. 13.) A journal can be a notebook-style or project-style file. With it, you can collect references to files in a project, develop presentation launch pads, document projects, and store many scripts in one place.

Journals enable you to store data tables and reports from a session, and then open it and its contents on demand. You can also have more than one journaled session file open at the time.

To create a journal file that contains a JMP session:

1 Open the files you would like to include in the journal.
2 Select **File > New > Journal**. Or, to append your open files to an existing journal, open that journal.
3 Right-click in the empty journal and select **Add All Open Files**.

Figure 4.7 Creating Journals of JMP Sessions



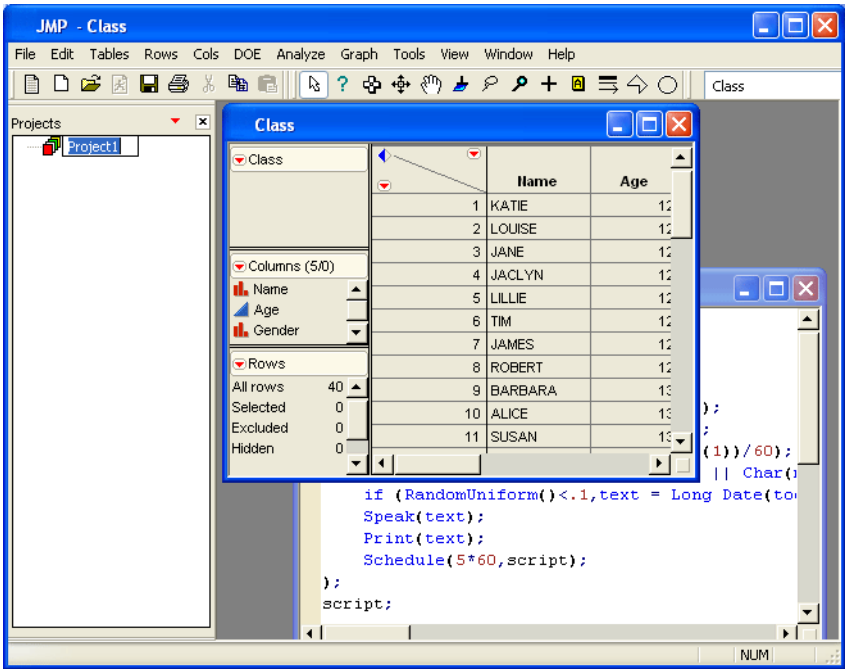
Working with JMP Projects (Windows Only)

A JMP Project is useful when you want to save multiple JMP file types (data tables, reports, scripts, or other JMP-supported formats) into a single file. This single JMP project file contains everything needed to re-open all the included files. This is its major difference from saved session scripts. The scripts save the state of the software, while the projects save the state along with the files.

Creating a JMP Project

To create a JMP project, choose **File > New > Project**. The Project window appears on the left side of the JMP application window.

Figure 4.8 New JMP Project Window

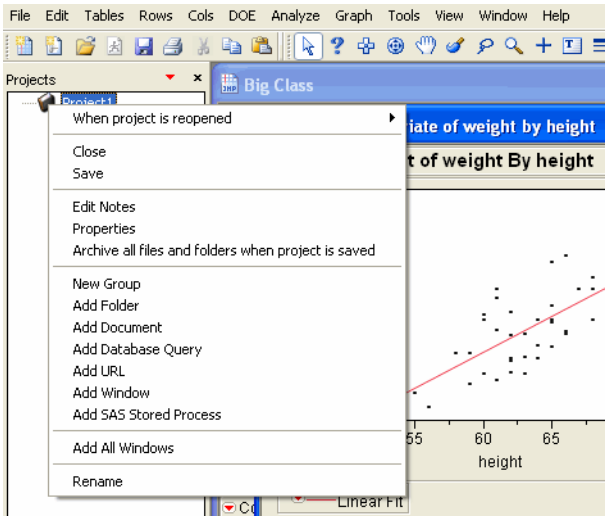


Saving and Closing a JMP Project

To save or close a JMP project, use the standard **File** menu or toolbar. In addition, you can use the Project menu, accessible by right-clicking the project name. (Figure 4.9).

When you save the project, links to the items in the project are saved rather than the items themselves. However, if the **Archive all files and folders when project is saved** command from the Project menu is checked, then a copy of each item is copied into the project archive. From this point on, if you open the project and modify an item, you are modifying the archived copy rather than the originals.

Figure 4.9 Project Menu



Opening a JMP Project

Open a JMP project by selecting **File** > **Open** and selecting **Project** from the **Files of type** field, or click the **Open Project** button in the JMP Starter.

Adding Items to a JMP Project

You can add either saved or open files to a JMP project. If a file has not already been saved, you are prompted to save it before it can be added to the project.

Using the Project Menu

To add items using the Project menu, right-click on the Project name and select the desired command.

Add Folder adds a new folder to the project.

Add Document adds a JMP document to the project. After selecting this item, you are presented with the standard File Open window, which is used to select a document to add.

Add Database Query opens the JMP database query Window, where you can create or open a query to a database. This query is then added to the project. See "Opening Data from a Database," p. 26, "Retrieving Data Using SQL Statements," p. 29, and "Using the WHERE Clause Editor," p. 33 for detailed information about creating queries.

Add URL opens the Internet Open window, where you can specify a URL to add to the project. See "Opening Remote Files," p. 36 for details about the Internet Open window.

Add Window lets you add an open JMP document to the project. If the file has not already been saved, you are prompted to do so before it is added to the project.

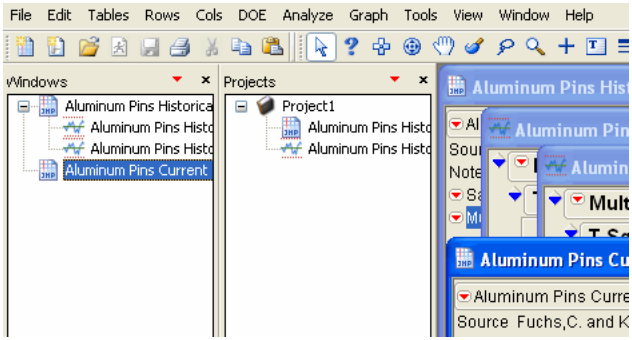
Add SAS Stored Process lets you add a SAS Stored Process. If you are not connected to a SAS Metadata Server, you are either connected to the server using your saved profile, or the SAS Server Connection window is opened for you. Once you are connected, you can select the SAS Stored Process to add to the project. See the "SAS Integration" chapter for details about SAS Stored Processes.

Using Drag-And-Drop

Items can also be added to a project using drag and drop from the Window list, the File System list, or from Microsoft Outlook.

To use the Window list, open it by selecting **View > Window List**. The window list appears as shown in Figure 4.10.

Figure 4.10 JMP Windows and Projects List



Similarly, you can drag and drop documents and folders from the File System list into your project. First, select **View > File System** if it is not showing. This gives you a view of connected storage systems. From this list, you can open files by double-clicking or drag the files into an open project.

Tip: In addition to files and folders, entire volumes can be added to JMP projects. E-mails, too, can be directly dragged into an open JMP project.

Customizing the Project

JMP has several commands that let you organize and customize your project.

Groups

JMP projects support hierarchical groups. Groups are useful for organizing your project files. To add a new group, select **New Group** from the Project menu (shown in Figure 4.9).

Notes

JMP enables you to add descriptive notes about a project. Select the **Edit Notes** command from the Project menu to add or edit a project's notes.

Saving a Log Window

Selecting **View > Log** displays a pane at the bottom of the JMP window that monitors JMP activities. You can use the log to locate errors in a script, correct JSL code, or retrieve requested information.

You might encounter instances where running a formula, matrix, or another operation writes information of interest to the log window. To save the contents of the log window:

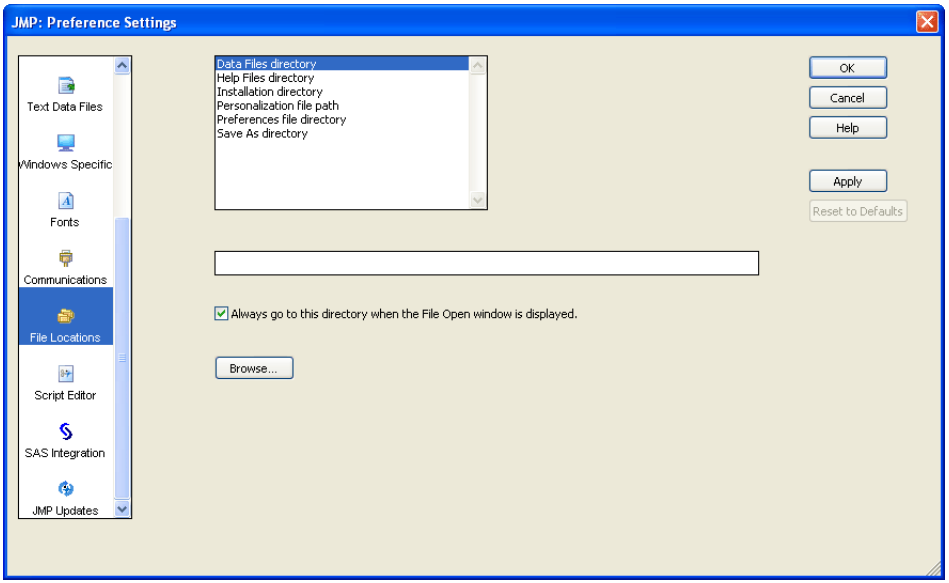
1 Select the Log window if it is floating, or place the cursor in the Log window if it is docked.
2 Select **File > Save As**.

Specifying Where to Save Files (Windows Only)

You can specify a default location for saving JMP data tables, journals, and graphic selections. To specify where to save these files:

1 Select **File > Preferences** and click the **File Locations** icon. Figure 4.11 appears.

Figure 4.11 Specifying Where to Save Files



2 Highlight **Save As directory** and click **Browse**.
3 Navigate into a directory where the file should be stored and click **OK**.
4 To have JMP use the specified directory every time you select **File > Save As,** check the box beside **Always go to this directory when Data/Journal Save As is displayed**.

Chapter 5

Properties and Characteristics of Data

Customizing Columns and Rows

Beyond the basics of formatting data is customizing your rows and columns to suit your analysis. You can exclude, hide, label, color, mark, or lock rows or columns. Doing so customizes the appearance of points in scatterplots and graphs.

Contents

Assigning Characteristics to Rows and Columns 131
Excluding Rows and Columns 131
Hiding Rows and Columns 132
Labeling Rows and Columns 133
Giving Rows a Color 134
Adding Markers to Rows 135
Assigning Colors or Markers to Rows According to Column Values 135
Deleting All Row Characteristics 137
Locking Columns in Place 138
Giving Columns a Preselected Analysis Role 138
Icon Indicators 139
Assigning Properties to Columns 140
Assigning Currency Formats 141
Giving Columns a Formula to Compute Values 142
Locking Columns 143
Adding Notes to Columns 143
Validating Column Data 144
Using Value Labels 147
Ordering Values in Columns 149
Assigning Value Color Ranges 151
Changing Columns' Default Axis Settings 152
Defining Low and High Values (DOE Coding) for Columns 153
Setting Columns as Factors for Mixture Experiments 154
Specifying How Rows Appear in Analysis Reports 155
Entering Specification, Control, and Response Limits 156
Giving Columns a Design Role 158
Identifying Factor Changes 158
Assigning Sigma Values to Columns 159
Specifying Columns' Measuring Units 160
Selecting a Distribution Type for the Column 161
Assigning a Time Frequency to Data 162
Creating Your Own Column Property 163
Removing Properties 163
Standardizing Attributes and Properties Across Columns 164
Using Row State Columns 165

Assigning Characteristics to Rows and Columns

You can exclude, hide, label, color, or mark rows and columns. Doing so customizes the appearance of points in scatterplots and graphs. Many markers and colors are available. You can also lock columns so they stay in place when you scroll.

The menu for row actions can be accessed from three places:

– the **Rows** menu in the main menu

– the red triangle in the rows panel

– the red triangle in the lower left corner of the data grid

Similarly, the menu for columns actions can be accessed from three places:

– the **Cols** menu in the main menu

– the red triangle in the columns panel

– the red triangle in the upper right corner of the data grid

The following sections show you how to assign properties and characteristics to rows and columns.

Excluding Rows and Columns

You can mark rows and columns so they will be excluded from analyses.

- Excluded data are excluded from calculations in text reports and graphs but are not hidden in plots.
- To hide excluded observations in plots, you must the **Hide/Unhide** characteristic. (See "Hiding Rows and Columns," p. 132.)
- A circle with a strikethrough ( ) appears beside either the row number or the column name in the column panel, indicating that the row or column is excluded and will not be used in analyses.
- Data remain excluded until you select **Exclude/Unexclude** again. This menu option is a toggle. Selecting **Exclude/Unexclude** once sets the highlighted rows or columns to be excluded. Highlighting excluded rows or columns and selecting **Exclude/Unexclude** again turns the option off so that the rows or columns are included in analyses.

To exclude one or more rows from analyses

1 Highlight one or more rows that you want to exclude.
2 Select **Exclude/Unexclude** from the **Rows** menu. (See Figure 5.1.)

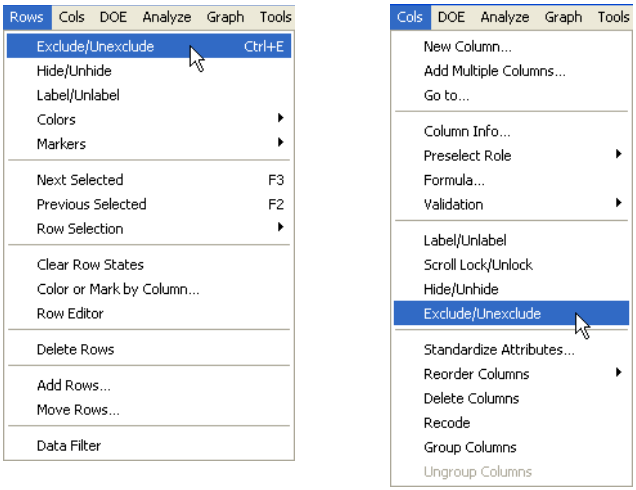
To exclude one or more columns from analyses

1 Highlight one or more columns that you want to exclude.
2 Select **Exclude/Unexclude** from the **Cols** menu. (See Figure 5.1.)

To unexclude rows or columns

1 Highlight the excluded rows or columns that you want to include in your analyses.
2 Select **Exclude/Unexclude** from the **Rows** menu or **Cols** menu. (See Figure 5.1.)

Figure 5.1 Excluding Rows (Left) or Columns (Right)



Hiding Rows and Columns

You can mark rows and columns so they will be hidden in plots and graphs.

- You suppress (hide) rows and columns so they are included in analyses but do not appear in plots and graphs.
- To exclude hidden observations from analyses, you must also assign them the **Exclude/Unexclude** characteristic.(“Excluding Rows and Columns,” p. 131.)
- A mask icon ( ) appears beside the hidden row number or the column name, indicating that the row or column is hidden.
- Data remain hidden until you select **Hide/Unhide** again. This menu option is a toggle. Selecting **Hide/Unhide** once sets the highlighted rows or columns to be hidden. Highlighting hidden rows or columns and selecting **Hide/Unhide** again turns the option off so that the rows or columns are shown.

To hide one or more rows

1 Highlight one or more rows that you want to hide.
2 Select **Hide/Unhide** from the **Rows** menu. (See Figure 5.2.)

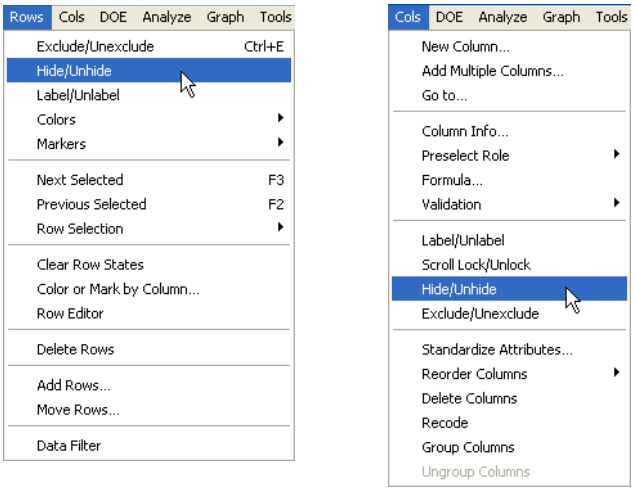
To hide one or more columns

1 Highlight one or more columns that you want to hide.
2 Select **Hide/Unhide** from the **Cols** menu. (See Figure 5.2.)

To unhide rows or columns

1 Highlight the hidden rows or columns that you want to show in your plots and graphs.
2 Select **Hide/Unhide** from the **Rows** menu or **Cols** menu. (See Figure 5.2.)

Figure 5.2 Hiding Rows (Left) or Columns (Right)



Labeling Rows and Columns

When you position the arrow cursor over a point in a plot, the point's label appears. By default, the label that appears is the row number. There are two ways you can customize the label:

- You can change the label so that it displays values found in one or more columns instead of the row number.
- You can enable the label to appear always, not just when you position the cursor over points.
- A label, or yellow tag, icon ( ) beside the column name in the columns panel indicates that points on plots will be identified by the column value. If there are multiple labeled columns, their values appear on plots separated by a comma.
- Data remain labeled until you highlight the column and select **Label/Unlabel** again. This menu option is a toggle. Selecting **Label/Unlabel** once sets the highlighted rows or columns to be labeled. Highlighting labeled rows or columns and selecting **Label/Unlabel** again turns the option off so that the rows or columns are no longer labeled.

To change the label so that it displays values found in one or more columns instead of the row number

1 Highlight one or more columns whose values you want to appear as the label in plots.
2 Select **Label/Unlabel** from the **Cols** menu. (See Figure 5.3.)

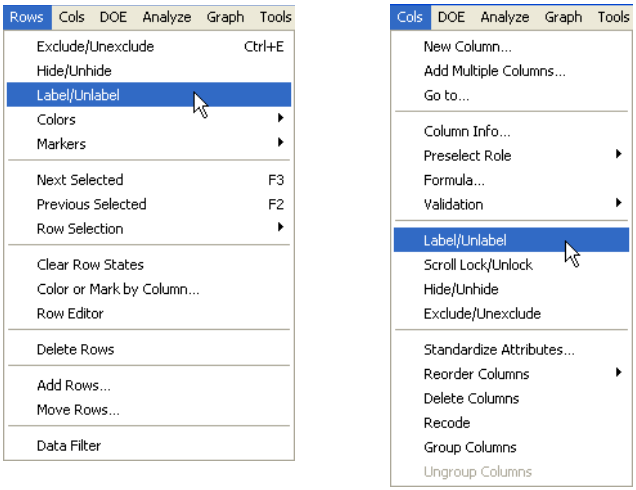
To enable the label to always appear (not just when you position the cursor over points)

1 Highlight one or more rows whose label you want to always appear in plots.
2 Select **Label/Unlabel** from the **Rows** menu. (See Figure 5.3.)

To turn off labeling for rows or columns

1 Highlight the labeled rows or columns that you no longer want labeled.
2 Select **Label/Unlabel** from the **Rows** menu or **Cols** menu. (See Figure 5.3.)

Figure 5.3 Labeling Rows (Left) or Columns (Right)

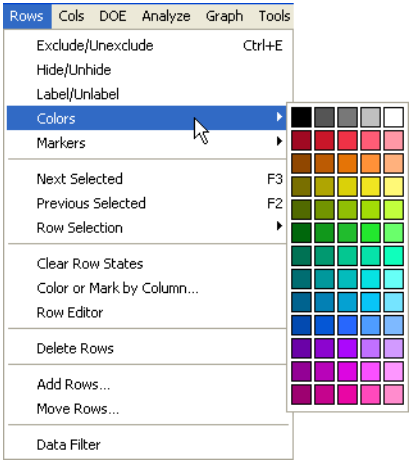


Giving Rows a Color

You can assign any colors to highlighted rows so the points in plots appear in the color you select. The active color assigned to a row appears next to the row number in the data grid.

1 Highlight one or more rows that you want to assign a color to.
2 Select **Colors** from the **Rows** menu. (See Figure 5.4.)
3 Select one of the available colors. (See Figure 5.4.)

Figure 5.4 Assigning a Color to One or More Rows



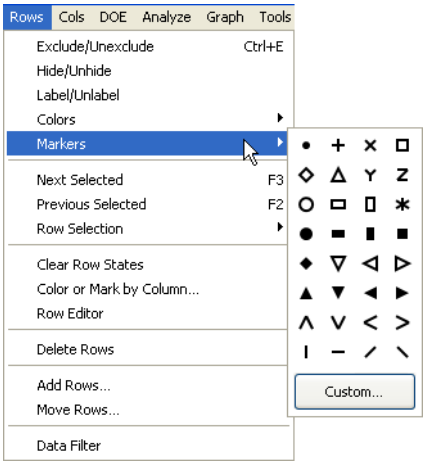
Adding Markers to Rows

You can assign a character from the JMP markers palette to replace the standard points in plots. These markers also appear next to row numbers in the data table.

1 Highlight one or more rows that you want to give a new marker shape.
2 Select **Markers** from from the **Rows** menu. (See Figure 5.5.)
3 Select one of the available marker shapes. (See Figure 5.5.)

Custom markers enable you to use alphabetic characters, numerals, and other symbols as markers. Click the **Custom** button and enter the desired marker into the window that appears.

Figure 5.5 Assigning a Marker to One or More Rows

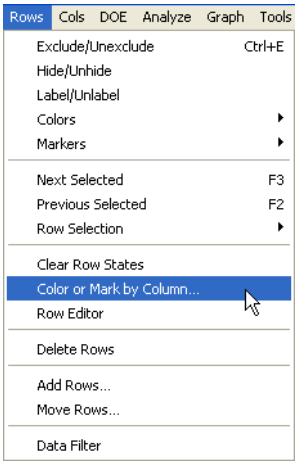


Assigning Colors or Markers to Rows According to Column Values

You can assign a different color or marker to each row in your data table based on the values found in a particular column. For example, JMP will give all rows whose value in the column Sex is F a red square marker and M a green plus marker. These colors and markers will replace the default black dot in plots and will appear next to its row number in the data grid.

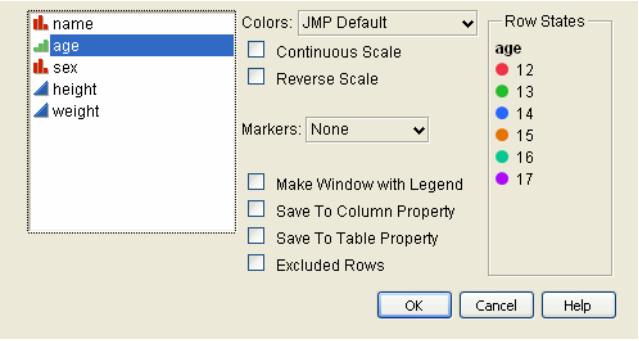
1 Select **Color or Mark by Column** from the **Rows** menu. (See Figure 5.6.)

Figure 5.6 Assign Colors or Markers by Column



2 Highlight the column to which you would like to assign the color or marker. (See Figure 5.7.)

Figure 5.7 Color or Mark by Column



3 Select any of the following options:

Action	Instructions
Assign a different color to each row in your data table based on the values found in the column you highlighted	You can change the color scheme by one of the color schemes from the **Colors** menu. Click **OK**.
Assign a different marker to each row in your data table based on the values found in the column you highlighted	Select one of the marker schemes from the **Markers** menu.
Include a legend with your new characteristics so you can easily identify which colors and markers correspond with which row	Select the **Make Window with Legend** check box.

Action	Instructions
Assign colors in a chromatic sequential fashion based on the values in the highlighted column	Select the **Continuous Scale** check box.
Assign colors in a reversed chromatic sequential fashion based on the values in the highlighted column	Select the **Reverse Scale** check box.
Save the color and marker information as a column property.	Select the **Save Column Property** check box.
Save the color and marker information as a table property.	Select the **Save Table Property** check box.
Assign colors or markers to rows that are excluded.	Select the **Excluded Rows** check box.

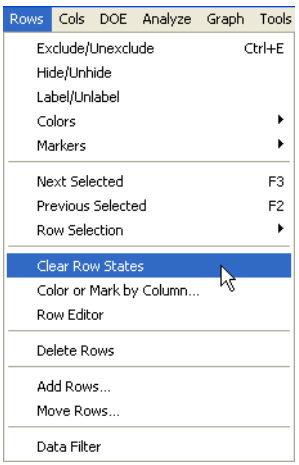
Note that a preview of your selection appears on the right side of the window, under Row States.

Deleting All Row Characteristics

To clear all row states in the data table, select **Clear Row States** from the **Rows** menu. (See Figure 5.8.)

All rows become included, visible, unlabeled, and show in plots as black dots. The **Clear Row States** command does not affect row states saved in row state columns, as described in "Using Row State Columns," p. 165.

Figure 5.8 Clear Rows States



Locking Columns in Place

You can scroll lock a column in place so when you scroll horizontally, the column remains visible. The name of a locked column is shown in italics in the columns panel to the left of the data grid.

- Scroll locked columns are moved to the left in the data table. Once you unlock them, they are not moved back to their original locations in the data table, but instead remain on the left.
- Columns remain scroll locked until you highlight the columns and select **Scroll Lock/Unlock** again. This menu option is a toggle. Selecting **Scroll Lock/Unlock** once locks the highlighted columns. Highlighting locked columns and selecting **Scroll Lock/Unlock** again turns the option off so that the columns are no longer locked.

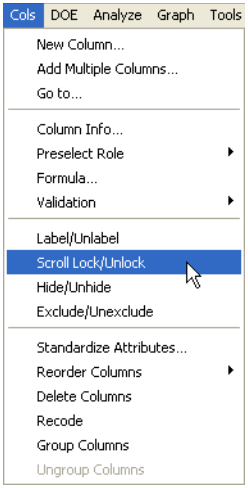
To apply a scroll lock to a column

1 Highlight one or more columns that you want to scroll lock. Note that hidden columns cannot be scroll locked.
2 Select **Scroll Lock/Unlock** from the **Cols** menu. (See Figure 5.9.)

To unlock a column

1 Highlight the scroll locked columns that you no longer want scroll locked.
2 Select **Scroll Lock/Unlock** from the **Cols** menu. (See Figure 5.9.)

Figure 5.9 Applying Scroll Lock



Giving Columns a Preselected Analysis Role

You can assign an analysis role, such as *x*, *y*, weight, or frequency, to a selected column and save the role with the data table. When you do this and then run an analysis, JMP uses the preselected role to automatically fill in the role boxes in windows so you do not have to specify these roles each time. For example, if you want a column named height to take the *x* role in every analysis you conduct with a particular data table, you assign it the preselected role of *x*.

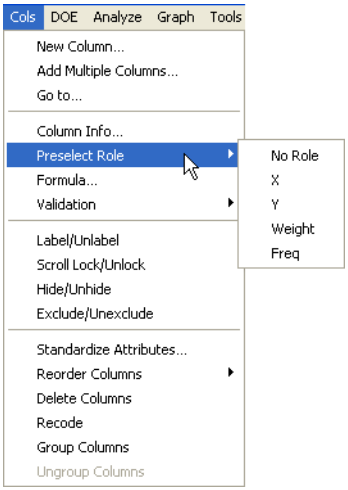
Note that when you select **Freq**, the values in that column are what JMP uses as the frequency of the observation. If *n* is the value of the **Freq** variable for a given row, then that row is used in computations *n* times. If the n is not an integer, then JMP truncates it. If it is less than 1 or is missing, then JMP does not use it to calculate any analyses.

When you select **Weight**, the values in that column provide weights for each observation in the data table. The variable does not have to be an integer, but it is included only in analyses when its value is greater than zero.

To assign a preselected role to a column

1 Highlight the column.
2 Select **Preselect Role** from the **Cols** menu. (See Figure 5.10.)
3 Select a role: **No Role**, **X**, **Y**, **Weight**, or **Freq** (Frequency).

Figure 5.10 Select Preselect Role



After selecting the appropriate roles, icons in the columns panel, as shown in Figure 5.11, signify what roles the columns have been assigned. Click the icon to access a list of roles and select a different one.

Figure 5.11 Preselected Roles in the Column Panel

Icon Indicators

After assigning characteristics, icons appear on the data grid to indicate some of the rows' or columns' assigned characteristics. The icons appear to the right of each column name in the column pane and to the left of the row number in the data table. l (See Figure 5.12.) You can click some icons on the right of each column name to reveal their contents. See Table 5.1 for a description of all the icons,

Figure 5.12 Column Characteristic Icons (Left) and Row Characteristic Icons (Right)

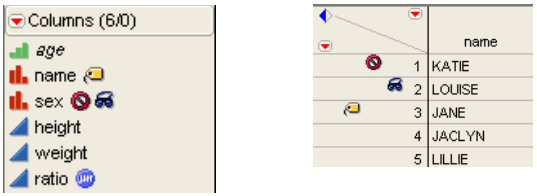


Table 5.1 Characteristic Icons

Icon	Description
	The column or row is excluded.
	The column or row is hidden.
	The column or row is used as a label.
Column Name	If the column name is shown in italics, the column is scroll locked.
	The column has a preselected role: *x*.
	The column has a preselected role: *y*.
	The column has a preselected role: *weight*.
	The column has a preselected role: *freq*.

Assigning Properties to Columns

In addition to the column characteristics described in "Assigning Characteristics to Rows and Columns," p. 131, columns can contain special column properties, such as notes for documentation, formulas that calculate the column's values, and restrictions on values.

After adding a property to a column, the properties icon ( ) appears in the data table's columns panel, indicating that the column contains a property. However, when formulas, range checks, and list checks are applied to a column, their own individual icons appear. If the column contains only the notes property or if there are no properties, the properties icon ( ) will not appear (Figure 5.13). Table 5.2 describes the column property icons.

Figure 5.13 Elements Indicating Properties

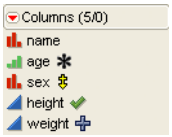


Table 5.2 Column Property Icons

Icon	Description
	The column contains a property. Click to view a list of properties that the column contains.
	The column contains a list check property. Click to view and edit the list.
	The column contains a range check property. Click to view and edit the range.
	The column contains a formula. Click to view and edit the formula.

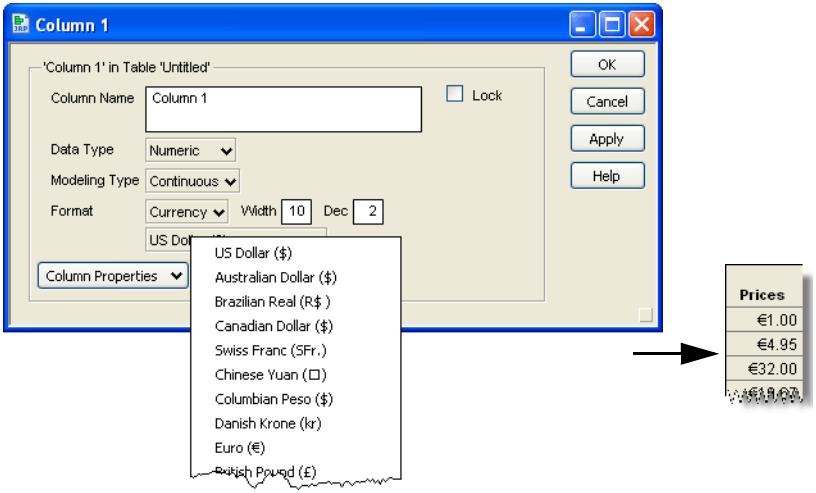
The following sections describe properties you can add to columns.

Assigning Currency Formats

Using the Column Info window, you can assign a specific currency format to a column. Once assigned, the currency symbol is displayed in the column and in graphs that contain the column.

To assign a format

1 Select **Cols > Column Info** for any continuous numeric data.
2 Select **Currency** from the Format menu.
3 Choose the currency unit from the menu that appears.



Giving Columns a Formula to Compute Values

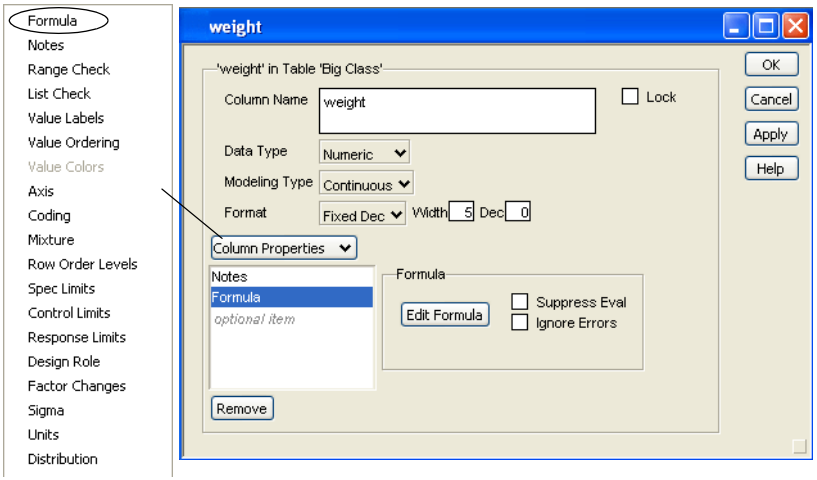
You can insert a formula into a column to compute the values for that column. Once you do this, the column becomes locked so its data values cannot be manually edited (this prevents invalidation of the formula).

To create a formula that will calculate the values for your column

1 Double-click the column name in the data grid. The Column Info window appears.

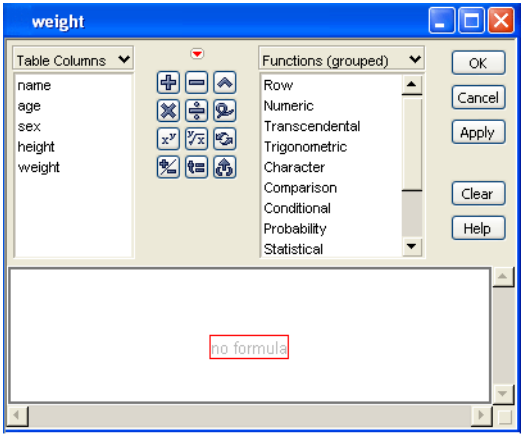
2 Select **Formula** from the **Column Properties** drop-down menu, as shown in Figure 5.14

Figure 5.14 Creating a Column Formula



3 Click the **Edit Formula** button.

4 Complete the formula. (See "Creating a Formula," p. 287, for details.) The box beside **Lock**, as shown in Figure 5.14, becomes checked, indicating that you cannot edit the column's values from the data table. (To edit values, you must first delete the formula.)



5 If you do not want JMP to evaluate the formula, click the box beside **Suppress Eval**. When formula evaluation is suppressed, part of the yellow plus icon (black on the Macintosh) beside the

column name in the column panel becomes gray. (See "Icon Indicators," p. 139, for details.)

6 If you do not want JMP to alert you of any errors in your formula, click the box beside **Ignore Errors**.

7 Click **OK**. The formula icon ( ) now appears next to the column name in the data table's column panel, indicating that the column contains a formula. Click the icon to edit the formula.

Locking Columns

You can lock a column so none of its values can be edited. After you lock a column, the lock icon ( ) appears next to the column name in the data table's column panel.

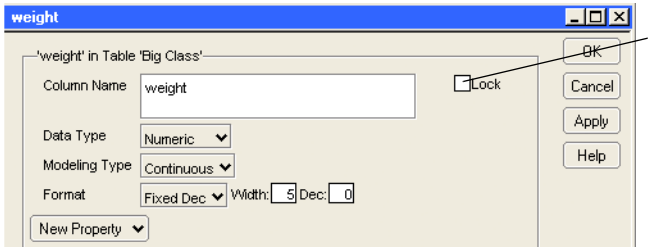
Note that a column automatically becomes locked when you add a formula. However, the lock icon ( ) will not appear beside that column's name in the column panel. Instead, the formula icon ( ) appears to indicate that the column contains a formula.

To lock a column

1 Double-click the column name in the data grid. The Column Info window appears.

2 Click the box beside **Lock**, as shown in Figure 5.15

Figure 5.15 Locking a Column



3 Click **OK**.

Adding Notes to Columns

Just as you can add notes to a data table in the form of a table variable, you can add notes to individual columns in the form of a column property. For example, you might want to document or keep notes for one or more columns in a data table, such as a description of the source of the data.

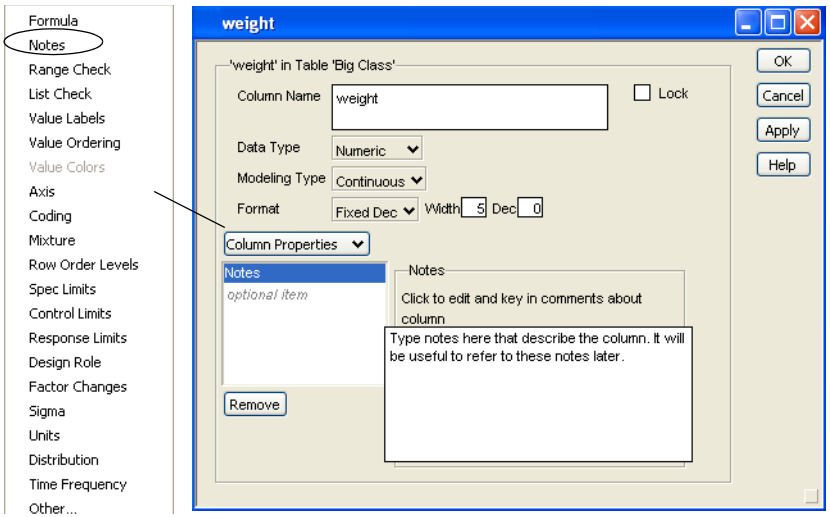
To add notes to a column

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Notes** from the **Column Properties** drop-down menu.

3 Type into the text box, as shown in Figure 5.16

Figure 5.16 Adding Column Notes



4 Click **OK**.

Validating Column Data

You can set up a column so that it accepts only certain values. These values can be individual numbers (list checking), or they can be all numbers that fall within a range (range checking). The following sections describe the two types of column validation.

List Checking

You can set up a column so it can contain only certain individual values that you specify. For example, you can set up a column so it can contain only the numbers 2, 4, or 6. When you do this, the cursor changes to when positioned over the column. If you try to enter a value not included on the validation list, a warning message appears. If you right-click a cell (Ctrl-click on the Macintosh), a menu of acceptable values appears. You can then select the cell value from the menu instead of typing it into the cell. You can add an item before an existing item in the list. Select the item you want the new item to go before, and then add the item.

List checking can save memory and disk storage when the data have only a few categories. Each distinct category is saved only once, and a one-byte code that maps to a table of categories is saved for each cell.

List checking is also useful when you would like your graphs or plots to order data in a certain way. For example, histogram bars are ordered alphabetically by default. To present them in a different order, create a list check where the values you enter are in the new order. They are then displayed in an output report in that order instead of the default order. (Note that list checking does not apply to bar charts.)

After you lock a column, the icon appears next to the column name in the data table's column panel.

To set up list checking

1 Highlight the column to which you want to apply the validation.

2 Access the list check information by taking one of the following actions:

- Double-click the column name in the data grid. The Column Info window appears. Select **List Check** from the **Column Properties** drop-down menu, as shown in Figure 5.17.
- Right-click the column name (hold the CONTROL key and click the column name on the Macintosh) and select **Validation > List Check**. The window in Figure 5.18 appears.
- Select **Cols > Validation > List Check**. The window in Figure 5.18 appears.

Figure 5.17 Select List Check as a New Property

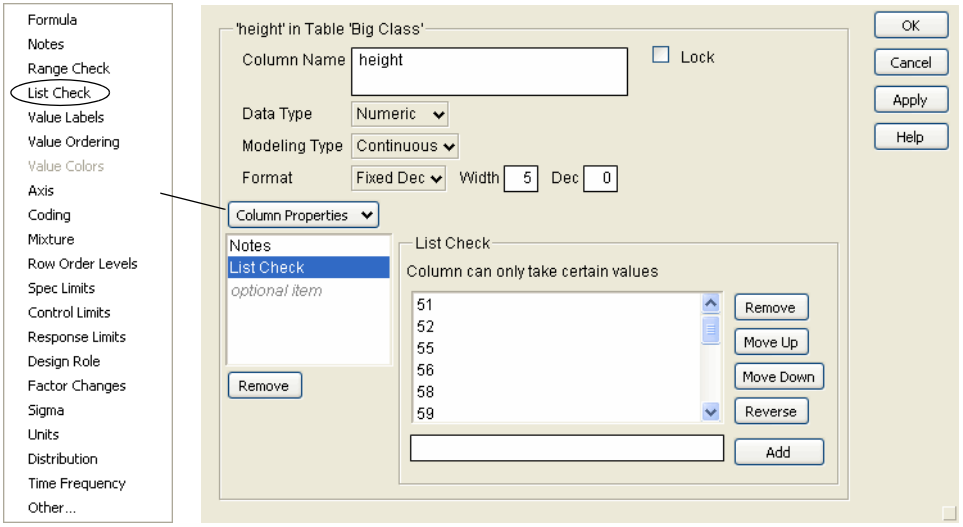
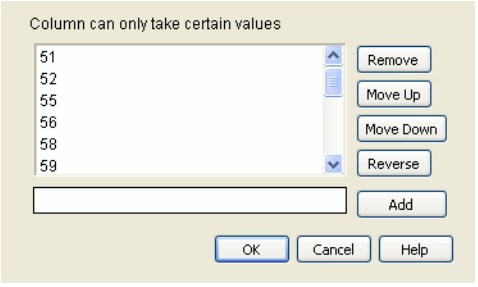


Figure 5.18 List Check Window



3 The list in the window contains values that JMP will accept. Use the table below to change the values:

Action	Instructions
Remove value(s) from the list	Highlight them and click the **Remove** button.
Add values to the list	Type the values into the empty text box and click **Add**.

Action	Instructions
Move the highlighted number to another position in the list	Click the **Move Up** and **Move Down** buttons, or use drag and drop. Remember that the order in which values appear in this list will be the order in which they appear in analysis reports.
Reverse the order of the list.	Click the **Reverse** button.

4 Click **OK**. The icon now appears next to the column name in the data table's column panel, indicating that the column contains a list check. Click the icon to make changes to the list check.

Range Checking

You can set up a column so that it can contain values only *within a range of numbers*. When you do this, the cursor changes to a checkmark ( ) when positioned over the column. If you try to enter a value outside the validation range, a window prompts you to change the cell value.

To set up range checking

1 Highlight the column to which you want to apply the validation.

2 Access the range check information by taking one of the following actions:

– Double-click the column name in the data grid. The Column Info window appears. Select **Range Check** from the **Column Properties** drop-down menu, as shown in Figure 5.19.

– Right-click the column name (hold the CONTROL key and click the column name on the Macintosh) and select **Validation > Range Check**. The window in Figure 5.20 appears.

– Select **Cols > Validation > Range Check**. The window in Figure 5.20 appears.

Figure 5.19 Select Range Check as a Column Property

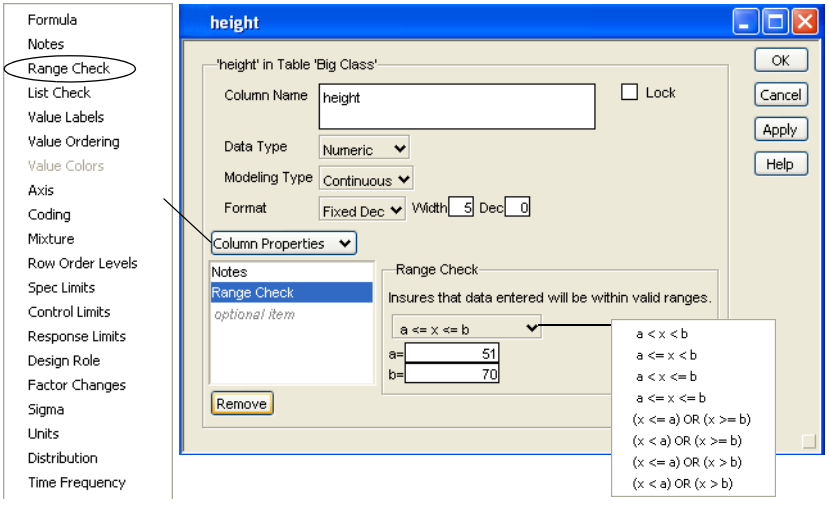
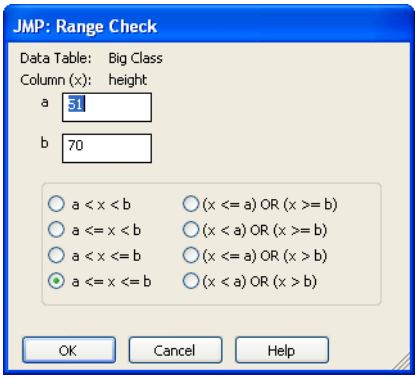


Figure 5.20 Range Check Window



3 Type the lowest value you want the column to accept into the box beside **a**.

4 Type the highest value you want the column to accept into the box beside **b**.

5 Select which formula to use to set up the range. Remember that *x* is the value entered into the column, *a* is the beginning of the range, and *b* is the end of the range. For a single-sided range check, leave either **a** or **b** empty.

6 Click **OK**. A checkmark (✔) now appears next to the column name in the data table's column panel, indicating that the column contains a range check. Click the icon to make changes to the range check.

Turning List/Range Checking Off

To turn off list or range checking

1 Right-click the column name.

2 Select **Validation > No Checking**.

Using Value Labels

Value labels enable you to display a label instead of a value in each instance that the value appears. When you assign value labels, the labels appear in the data table instead of the original values, but the original values are not lost. They can be displayed by double-clicking the label.

Also note the following points:

- When your data table contains value labels, using the **Search** commands will search for actual values, but will not search for labels.
- When your data table contains value labels, the row editor will display the label, and when the cell is highlighted for editing, it will show the actual value.
- If you copy and paste a cell with a value label, the actual value is pasted.
- Missing values can be labeled using Value Labels.

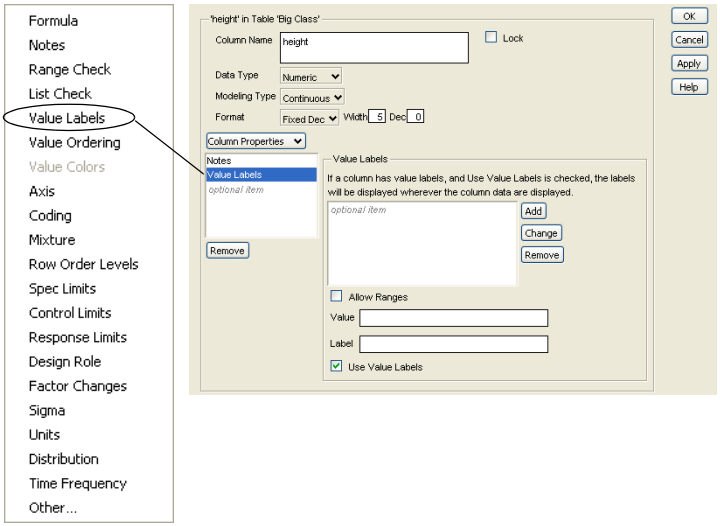
To set up value labels

1 In the data table, locate the column to which you want to apply the value label and double-click the

area above the column name. The Column Info window appears.

2 Select **Value Labels** from the **Column Properties** drop-down menu, as shown in Figure 5.21.

Figure 5.21 Select Value Labels as a New Property



3 In the **Value** text box, type the value you want to give a label.

4 In the **Label** text box, type what you want to appear as the label.

5 Click **Add**.

6 To create more value labels, repeat the above steps.

7 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

To turn value labels off without deleting what you have set up, clear the **Use Value Labels** choice.

To edit a value label that already exists

1 In the data table, locate the column to which you want to apply the value label and double-click the area above the column name. The Column Info window appears.

2 Highlight **Value Labels** in the **Current Properties** box.

3 Highlight the value label you want to edit.

4 To edit its value, enter a new value into the **Value** box and click **Change**.

To edit its label, enter a new label into the **Label** box and click **Change**. The new value and/or label appears in the place of the highlighted one.

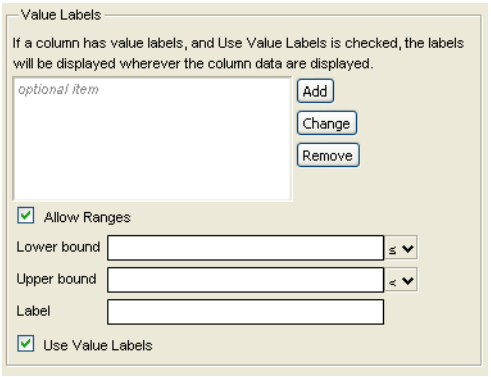
5 When finished, click **OK**.

Note: In a formula, when you reference a column using value labels, hover your mouse over the value label to see the actual data value.

To use ranges in a value label

1 In the data table, locate the column to which you want to apply the value label and double-click the area above the column name. The Column Info window appears.

2 Highlight or add **Value Labels** in the **Current Properties** box.
3 Click the **Add Ranges** check box.
4 You can now enter lower and upper bound for each label.

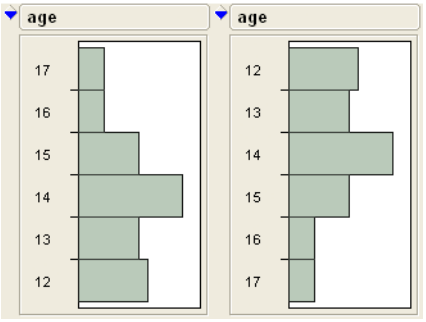


Note: To assign a label to missing values, enter a period (.) for the lower bound and leave the upper bound empty. To assign a label to all other values, enter three periods (...) for the lower bound and leave the upper bound empty.

Ordering Values in Columns

Categorical values in a JMP report might not appear in the order you prefer. For example, instead of showing ages from high to low (to the left in Figure 5.22), you might want to list ages from low to high (to the right in Figure 5.22). To do this, use the Value Ordering column property.

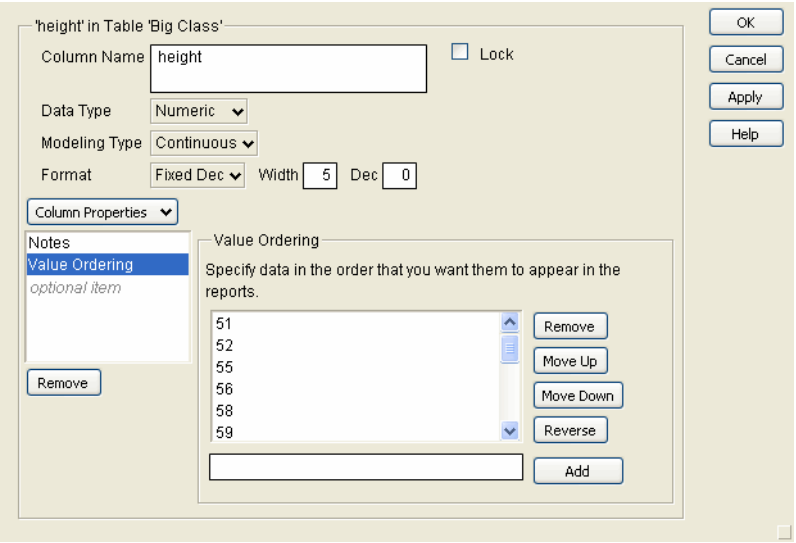
Figure 5.22 Report with the Default Order (left) and Report with Value Ordering Property (Right)



To assign the column the Value Ordering property

1 Double-click the column name in the data grid. The Column Info window appears.
2 Select **Value Ordering** from the **Column Properties** drop-down menu. Value ordering information appears on the right, as shown in Figure 5.23.

Figure 5.23 The Value Ordering Window



3 The list in the window contains values in the order JMP will display them in reports. Use the table below to change the order of the values:

Action	Instructions
Remove value(s) from the list	Highlight them and click the **Remove** button.
Add values to the list	Type the values into the empty text box and click **Add**.
Move the highlighted number to another position in the list	Click the **Move Up** and **Move Down** buttons. Remember that the order in which values appear in this list will be the order in which they appear in analysis reports.
Reverse the sort order	Click the **Reverse** button.

4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Note: If you use both the Value Ordering and Row Order Levels properties, the Value Ordering property overrides the Row Order Levels.

If your values include any of the following, they will automatically appear in the appropriate order in reports. You do not need to assign their columns the Value Ordering property.

- January, February, March, April, May, June, July, August, September, October, November, December
- Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
- Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
- Very Low, Low, Medium Low, Medium, Medium High, High, Very High

- Strongly Disagree, Disagree, Neutral, Indifferent, Agree, Strongly Agree
- Failing, Unacceptable, Very Poor, Poor, Bad, Acceptable, Average, Good, Better, Very Good, Excellent, Best

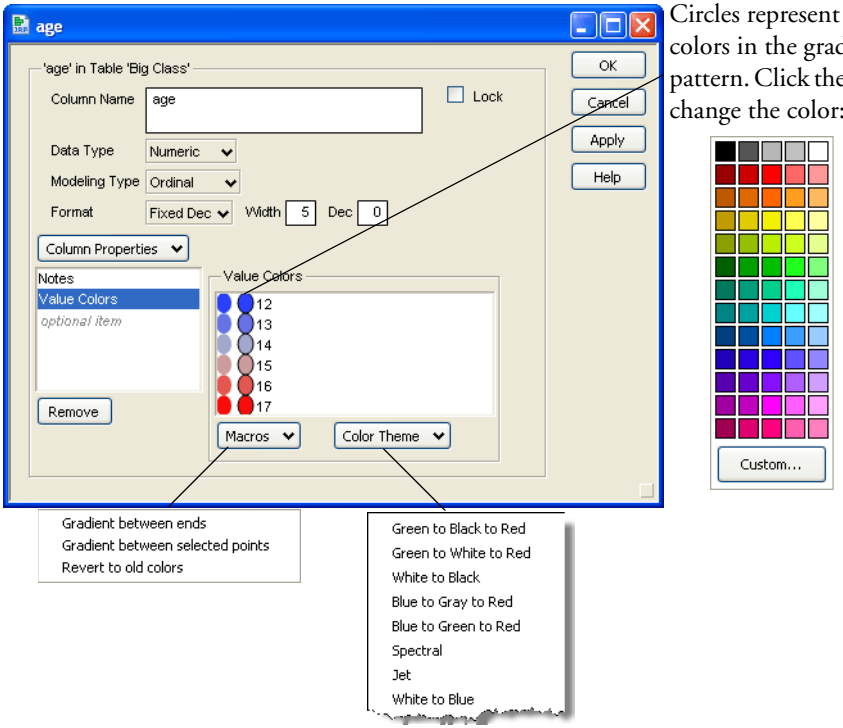
Assigning Value Color Ranges

In mosaic plots, nominal and ordinal values appear color-coded. In other plots with a legend displayed, the values are color-coded. You can assign the values of a nominal or ordinal column a certain color or range of color gradients. Once you do that, the column's values appear with an assigned color in all applicable graphs.

To assign a column color values

1 Highlight a nominal or ordinal column in the data table.
2 Select **Cols > Column Info**. The Column Info window appears.
3 Select **Value Colors** from the **Column Properties** drop-down menu. Value color information appears on the right, as shown in Figure 5.24.

Figure 5.24 The Color Values Box



4 To change a color, right-click a color circle on the right and select a color. To use a color theme, select it from the **Color Theme** menu.
5 Use the **Macros** button to do the following:

Gradient between ends Sets the colors of the top and bottom values so JMP can apply a color gradient across the entire range of values. Use this command to make all the colors in between for the other levels.

Gradient between selected points Sets the colors of the top and bottom values so JMP can apply a color gradient to a range of values you have highlighted in the Value Colors list.

6 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Changing Columns' Default Axis Settings

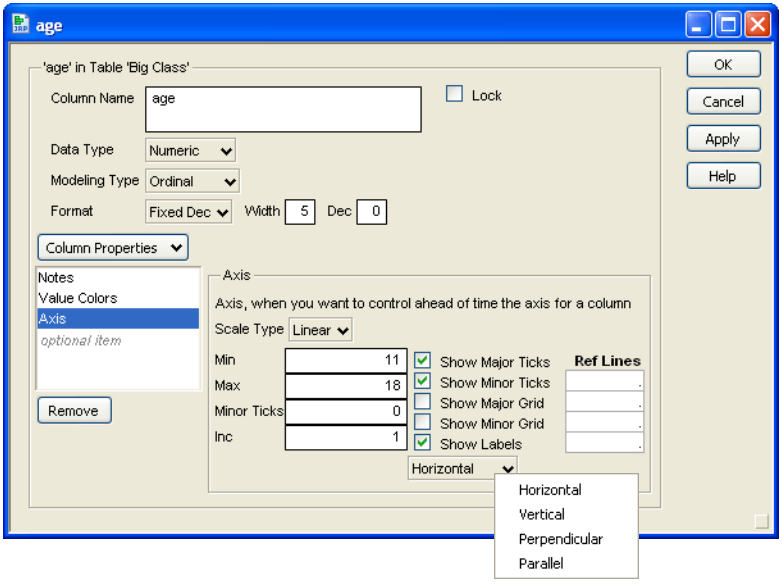
You can specify default axis settings for a column so whenever the column is used in analysis, JMP automatically uses the specified settings. These settings include the minimum and maximum values, number of increments, number of tick marks, and so on.

To specify default axis settings

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Axis** from the **Column Properties** drop-down menu. Axis information appears on the right, as shown in Figure 5.25.

Figure 5.25 The Axis Box



3 Use the table below to specify axis properties:

Action	Instructions
Change the scale type (linear or log)	Click the drop-down menu beside **Scale Type** and select either **linear** or **log**.

Action	Instructions
Set minimum and maximum values you want the graph to display.	Type values in the box beside **Min** and **Max**.
Specify the number of increments on the graph	Type the number in the box beside **Inc**.
Specify the number of minor tick marks on the graph	Type the number in the box beside **Minor Ticks**. Then, click the boxes beside **Show Minor Ticks**.
View major tick marks, major gridlines, minor gridlines, and labels	Click the boxes beside **Show Major Ticks**, **Show Minor Ticks**, **Show Major Grid**, **Show Minor Grid**, and **Show Labels**.
Display the labels on the *x*-axis vertically instead of horizontally	Click the box beside **Rotated Labels**.
Add up to four reference lines to the graphs	In the boxes under **Ref Lines**, type a value for each, and up to four lines will appear on your graphs at the indicated positions.
Change the orientation of the axis labels	**Horizontal** and **Vertical** describe orientations for single axes. **Perpendicular** and **Parallel** describe orientations for paired axes (for example, in Scatterplot Matrices)

4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

An alternate way to set the default axis properties for a column is to:

1 Create the graph.
2 Change the axis to your preferred specifications. (See "Customizing Axes and Axis Labels," p. 200.)
3 Right-click the axis and select **Save to Column Property**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Defining Low and High Values (DOE Coding) for Columns

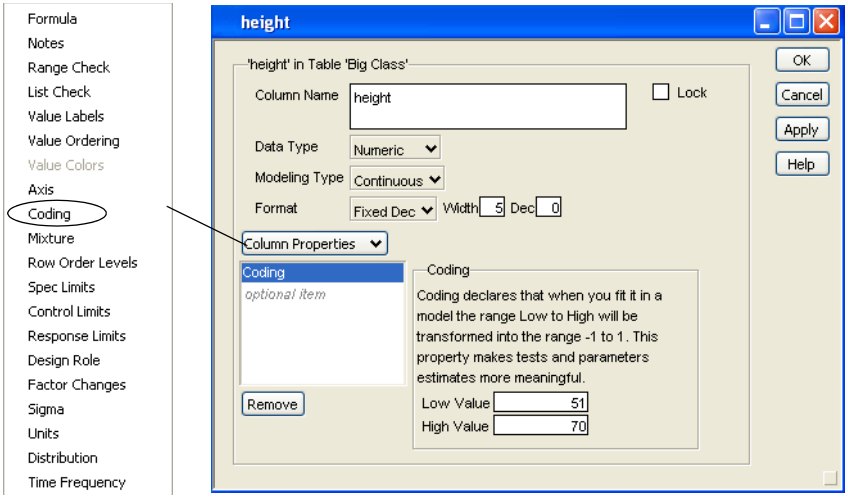
When you fit a column in a model, the low and high values of the column are transformed to –1 and 1, which makes tests and parameter estimates more meaningful. This is referred to as *coding* and can be used for any continuous variable. It is the default for continuous factors generated by the DOE commands in JMP. Note that if a column has one or more limits missing, JMP substitutes the data's minimum and maximum for the high and low values.

To specify which values you want to use as the low and high values in a column

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Coding** from the **Column Properties** drop-down menu. Coding information appears on the right, as shown in Figure 5.26.

Figure 5.26 Coding Window



3 Type the values you want to use as low and high values into the text boxes.

4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Setting Columns as Factors for Mixture Experiments

You might have a column in a data table that is one of several factors that form 100% of a mixture. You can set up the column so JMP uses it to automatically generate a no-intercept model (using the Fit Model command) when you analyze the data.

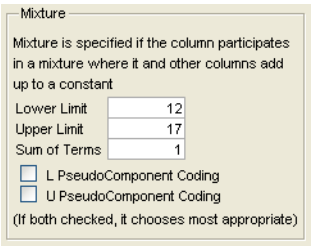
Note that after setting columns as factors for mixture experiments, the properties icon ( ) appears next to the column name in the data table's column panel, indicating the column contains a property.

To set a column as a factor

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Mixture** from the **Column Properties** drop-down menu. Mixture information appears on the right, as shown in Figure 5.27.

Figure 5.27 Mixture Information


Mixture
Mixture is specified if the column participates in a mixture where it and other columns add up to a constant
Lower Limit 12
Upper Limit 17
Sum of Terms 1
L PseudoComponent Coding
U PseudoComponent Coding
(If both checked, it chooses most appropriate)

3 Enter the upper and lower limits as well as the sum of terms.

4 Check the boxes beside **L** and **U PseudoComponent Coding**, if desired. Using the example in Figure 5.27, where the mixture sum value is 1, the terms are coded as:

$X_iL = (X_i - L_i)/(1 - L)$ for the L pseudocomponent

$X_iU = (U_i - X_i)/(U - 1)$ for the U pseudocomponent

where L_i and U_i are the lower and upper bounds, L is the sum of L_i and U is the sum of U_i. If you check both in this example, the Fit Model platform uses the L coding if $(1 - L) < (U - 1)$, and the U coding otherwise.

In the Fit Model report, the main effects are labeled with the coding transformation. Crossed effects are not labeled, but coding values are used. All the features of fitting, such as the profilers and saved formulas, respect the pseudocomponent coding but present the uncoded values in the tables and plots.

5 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Specifying How Rows Appear in Analysis Reports

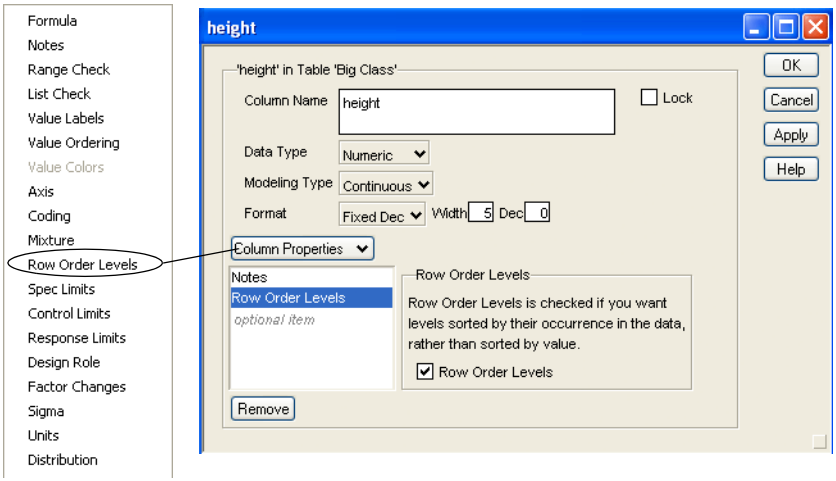
By default, the row data in an analysis report is ordered by the data's values. However, if you would like to view row data in an analysis report in the order it appears in the data table column, you can change the default setting.

To specify how rows appear

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Row Order Levels** from the **Column Properties** drop-down menu, as shown in Figure 5.28. A **Row Order Levels** check box appears on the right.

Figure 5.28 Specifying Row Order Levels



3 Make sure there is a check in the box beside **Row Order Levels**.

4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's

column panel, indicating the column contains a property.

5 Remember that what you have done in the above steps applies only to the selected column. To apply it to other columns, repeat the above steps for each column or use the Standardize Attributes command, which is explained in "Standardizing Attributes and Properties Across Columns," p. 164.

Tip: If you would like your rows to appear in the analysis reports in another order (besides according to their values or their occurrence in the data table columns) use the value ordering property. See "Ordering Values in Columns," p. 149, for details. The Value Ordering property overrides the Row Order Levels property when both are evoked.

Entering Specification, Control, and Response Limits

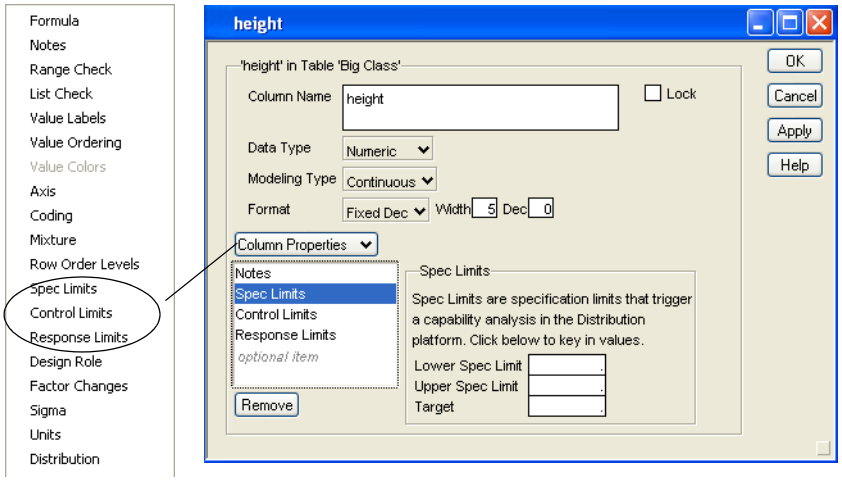
You can save specification, control, and response limits in a column. If you do this, you can run a capability analysis, control chart analysis, or analyses displaying the prediction and contour profilers without having to re-specify roles and limits each time. Saving these limits in a column facilitates consistency from use to use. For example, if you run an analysis that uses these limits, then come back later and change the data, you can run a new analysis on the new data using the same limits.

To enter specification, control, and response limits

1 Double-click the column name in the data grid. The Column Info window appears.

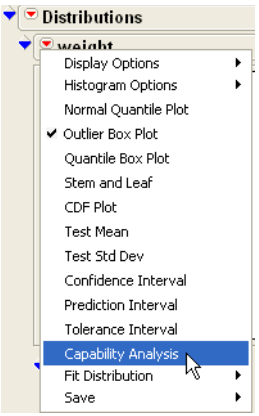
2 Select one of the following from the **Column Properties** drop-down menu, as shown in Figure 5.29.

Figure 5.29 The New Property List



Spec Limits Lets you enter a lower spec limit, upper spec limit, and target value for a numeric column. When you assign a column these values, JMP automatically uses them when you run a capability analysis (this type of analysis is run after you have selected **Analyze > Distribution**), as shown in Figure 5.30.

Figure 5.30 Capability Analysis Using Spec Limits Found Within a Column

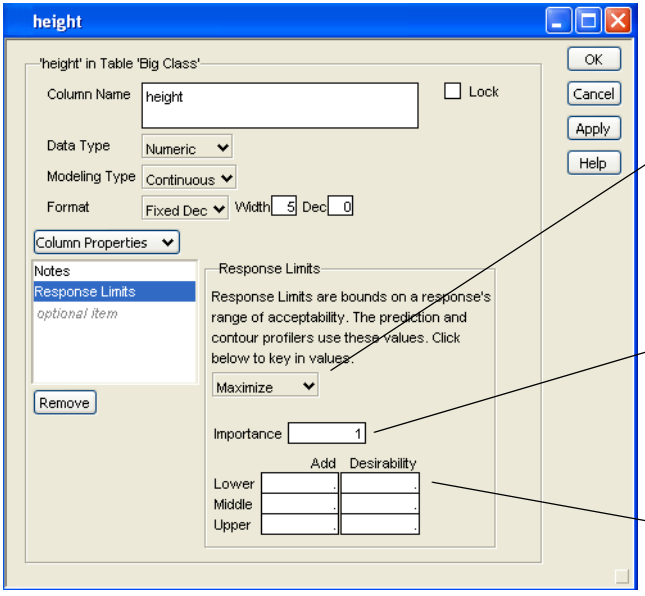


If you have given column spec limits, JMP will use them to create a capability analysis when it is selected from a distribution output report

Control Limits Lets you select a control chart type and then enter the values you want to use for average (**Avg**), lower control limit (**LCL**), and upper control limit (**UCL**) for each chart. If you do not enter a value for **Avg**, **LCL**, and **UCL**, then JMP includes a calculated value in the control chart for any of these three values that you did not specify. These values will be saved with the column and automatically used when you run an analysis using **Graph > Control Chart**.

Response Limits Lets you define response column values for use in analyses such as those displaying the prediction and contour profilers or DOE. You can specify values for the lower, middle, and upper limits, and desirability values, as shown in Figure 5.31. You can also select **Maximize**, **Match Target**, **Minimize**, or **None**, which are possible goals for a DOE response variable. If you have two responses, you can enter an importance value, which lets JMP know how to weigh one response's importance against another's.

Figure 5.31 Defining Response Column Values



Click to select a goal for the response variable. For example, if you are in the prediction profiler and want the desired value to be close to zero, select **Match Target**

When you have two responses, enter a number to indicate the amount of weight you want this response to have when JMP computes the overall desirability

Enter the lower, middle and upper limits as well as the desirability values

3 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Giving Columns a Design Role

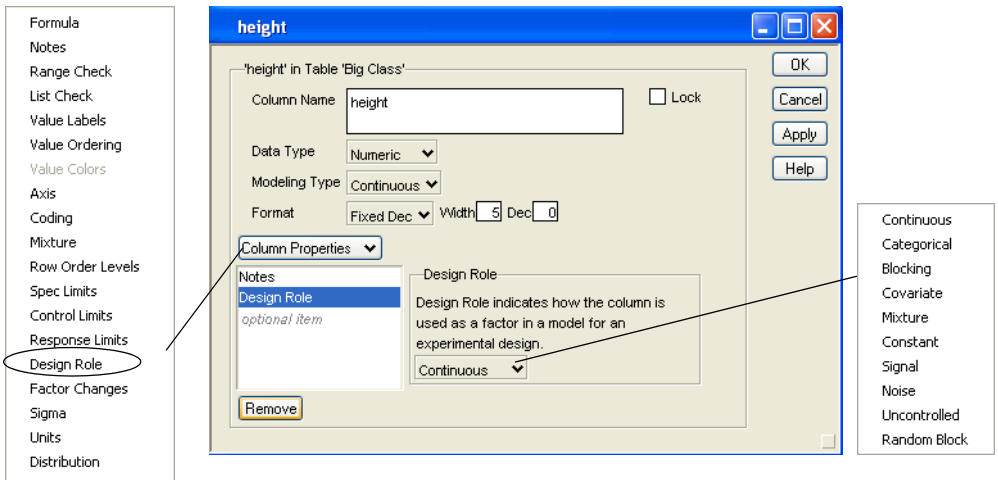
You can tell JMP how to use a factor column in a model to design an experiment. You can tell JMP to use it as a continuous, categorical, blocking, covariate, mixture, constant, signal, or noise factor.

To give a column a design role

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Design Role** from the **Column Properties** drop-down menu, as shown in Figure 5.32. Design role information appears on the right.

Figure 5.32 Choosing a Design Role



3 Click the Design Role drop-down menu and select the option that specifies how you want JMP to use the factor column: **Continuous**, **Categorical**, **Blocking**, **Covariate**, **Mixture**, **Constant**, **Signal**, **Noise**, **Uncontrolled,** or **Random Block**.

4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Identifying Factor Changes

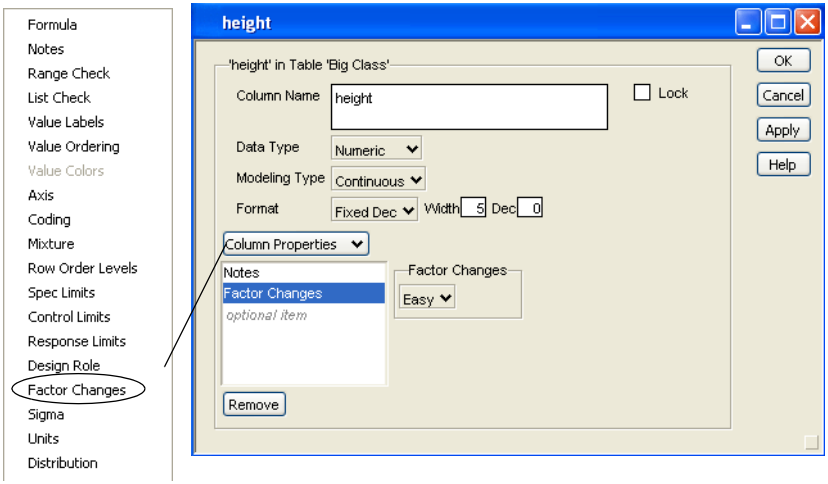
To create a split plot design using the JMP DOE (Design of Experiments) commands, you must identify a factor as "hard," meaning that the factor would be difficult to change. Identifying a factor as "hard" can be done in the DOE design pane each time you design an experiment. l (See the *JMP Design of Experiments* for more information about creating split plot designs.) However, if you want to create a split plot design every time you use a certain factor, you can save yourself steps by setting up that factor to be "hard" in all experiments.

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Factor Changes** from the **Column Properties** drop-down menu, as shown in Figure 5.33.

Factor changes information appears on the right.

Figure 5.33 Choosing a Factor Change



3 Click the Factor Changes drop-down menu and select the option that specifies how you want JMP to use the factor column: **Easy**, **Hard**, or **Very Hard**.

4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Assigning Sigma Values to Columns

You can enter a known Sigma to be saved with the column to be used by applications, such as control charts, that require a Sigma value to complete computations. If no value is supplied, Sigma is calculated from the sample.

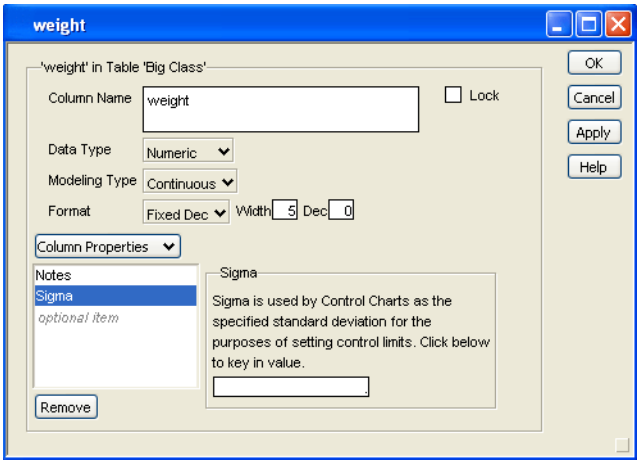
To assign a value to Sigma

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Sigma** from the **Column Properties** drop-down menu.

3 Type the value to be used for Sigma into the text box shown in Figure 5.34.

Figure 5.34 Sigma Window



4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Specifying Columns' Measuring Units

You can specify, within a column, the measurement units that were used to collect the data. For example, you might want a column to indicate that age values are measured in months or that a monetary value is in thousands of dollars.

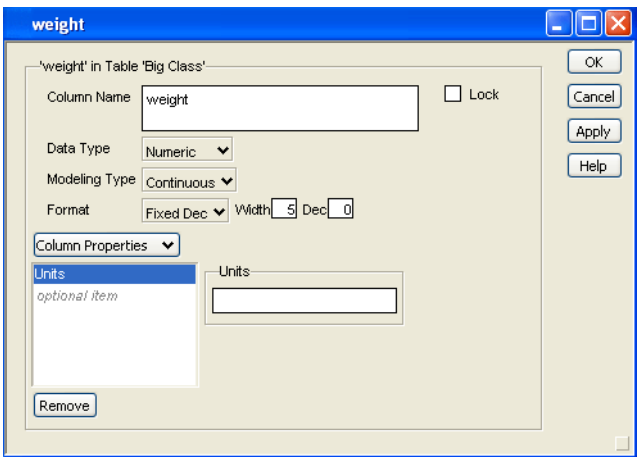
To add a measuring unit to a column

1 Double-click the column name in the data grid. The Column Info window appears.

2 Select **Units** from the **Column Properties** drop-down menu.

3 Type the measurement you want to use in the text box shown in Figure 5.35.

Figure 5.35 Units Window



4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

Selecting a Distribution Type for the Column

For a column that contains continuous numeric data, you can select the **Distribution** column property to produce the following results in the Distribution report:

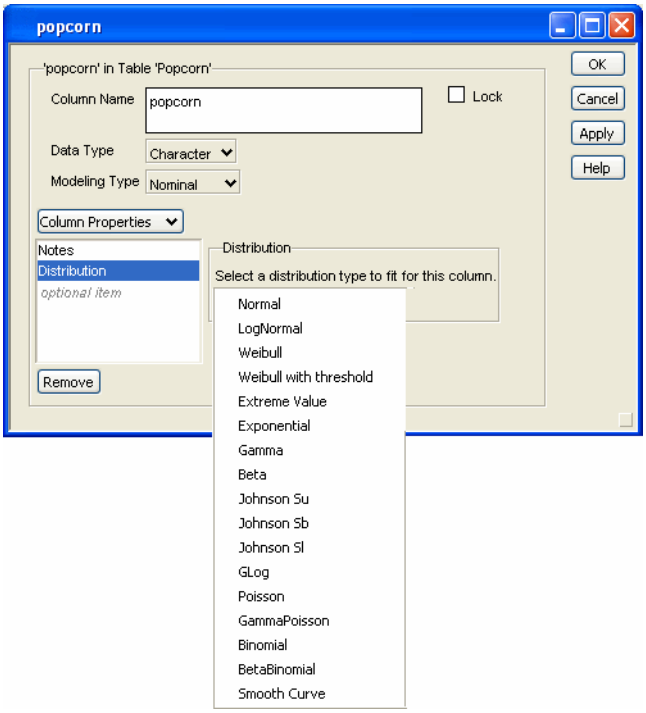
- Whenever you run the Distribution report (**Analyze > Distribution**) for the column, JMP *automatically* estimates a fit using the distribution specified and draws the curve representing how the column's data is distributed.
  By default, a column has *no* Distribution column property. If you do not select the Distribution column property, then JMP does not draw the column's fit curve in the distribution nor does JMP report any information about the fit. (You could add this information to the Distribution report after you run it, of course.)
- If you set *both* the **Distribution** type *and* the **Spec Limits** column property ("Entering Specification, Control, and Response Limits," p. 156), then the Distribution report produces a **Capability Analysis** report table that is of the distribution type you selected for the column.

Set the **Distribution** column property only when you already know how the data is distributed (for example, you might already know before you run **Analyze > Distribution** that the data has a Weibull distribution).

There are two ways to add the Distribution column property. The first way is as follows:

1 Double-click the column name in the data grid. The Column Info window appears.
2 Select **Distribution** from the **Column Properties** drop-down menu.
3 Select the type of distribution you want to use for the column, as shown in Figure 5.36.

Figure 5.36 Selecting the Distribution Column Property



4 Click **OK**. The properties icon ( ) now appears next to the column name in the data table's column panel, indicating the column contains a property.

The second way to add the distribution type to the window (along with the specification limits) is as follows:

1 From the red triangle menu in the column's report title bar, select **Fit Distribution** and select a type of distribution. JMP draws a fit curve on the histogram and adds a report table for the fitted distribution.

2 From the red triangle menu in the fitted distribution's report table, select **Spec Limits**. Enter the specification limits ("Entering Specification, Control, and Response Limits," p. 156) to generate a distribution-specific capability analysis.

3 From the same red triangle menu in the fitted distribution's report table, select **Save Spec Limits**. This saves both the specification limits and the associated distribution in the column properties for future use.

Assigning a Time Frequency to Data

The Time Series platform sometimes needs to know the frequency that data is reported (**Annual**, **Monthly**, **Weekly**, **Daily**, **Hourly**, **Minute**, **Second**). This lets JMP take things like leap years and leap days into account. If no frequency is specified, the data is treated as equally spaced numeric data.

Creating Your Own Column Property

You can create your own column property and assign any name you choose. This property is then available for JSL programming.

1 Double-click the column name in the data grid. The Column Info window appears.
2 Select **Other** from the **Column Properties** drop-down menu.
3 Type a name for the new property.

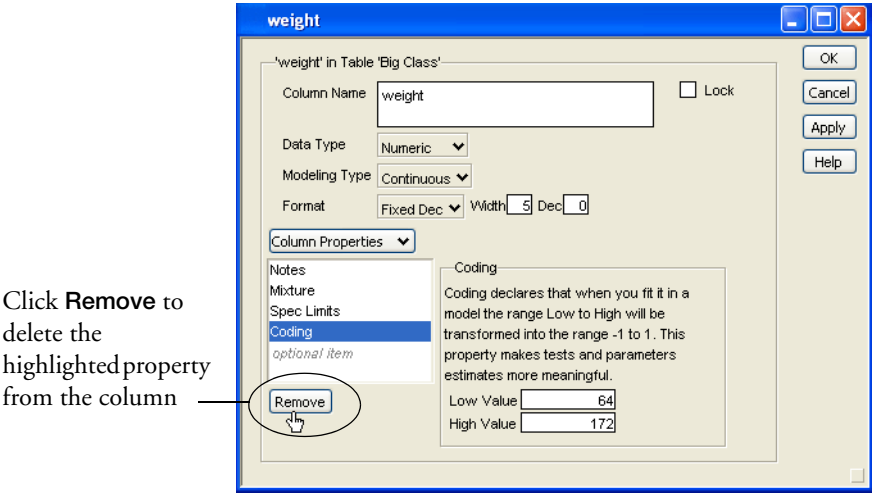
4 Enter a value for the property.

Removing Properties

Column properties can be added or deleted at any time. To delete a property:

1 Double-click the column name in the data grid. The Column Info window appears.
2 Select the property in the **Current Properties** drop-down menu and click **Remove**, as shown in Figure 5.37.

Figure 5.37 Removing Properties



Standardizing Attributes and Properties Across Columns

When a column contains attributes (data types, modeling types, numeric formats, and so on) or properties (formulas, notes, list and range checks, and so on) that you want other columns to have, you can use the existing column to *standardize* the attributes and properties across columns. This includes both adding and deleting attributes and properties.

Adding Attributes and Properties

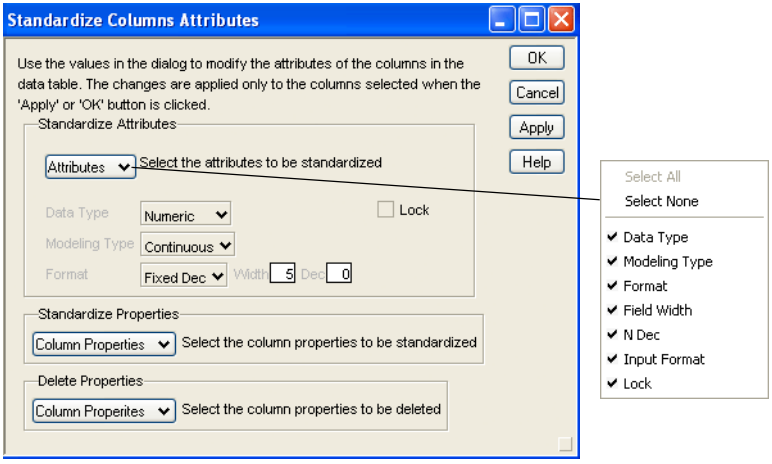
To apply an existing column's attributes and properties to multiple columns

1 Select the column containing the desired attributes or properties.

2 Select **Cols > Standardize Attributes**. The window in Figure 5.38 appears.

3 Click the **Attributes** button (Figure 5.38), and select items to be duplicated across columns.

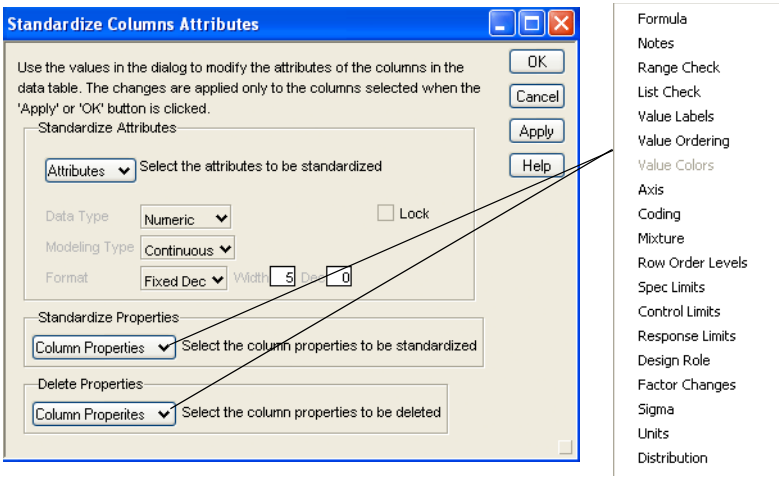
Figure 5.38 Standardizing Attributes Across Columns



4 To change the values of any of the attributes, use the drop-down menus and text boxes in the attributes information area.

5 Click the **Column Properties** button in the Standardize Properties area and set up the properties you want the other columns to have, as shown in Figure 5.39.

Figure 5.39 Standardizing Properties Across Columns



6 Click out of the Standardize Columns Attributes window and into the data table.
7 Highlight the columns in the data table to which you want to apply the attributes and properties.
8 Click back into the Standardize Columns Attributes window and click **Apply**. The attributes and properties apply to all the selected columns in the data table. You can view your results.
9 Click **OK**.

Tip: You can select all the columns you want to standardize and then select **Cols > Standardize Attributes**. The first selected column (left-most) is used to set up the window's values. Then you might skip steps 6 and , because you have already selected the columns.

Deleting Properties

To delete the same properties across multiple columns

1 Select the column containing the attributes or properties you want to delete.
2 Select **Cols > Standardize Attributes**.
3 Click the **Column Properties** button in the Delete Properties area and select the properties you want to delete.
4 Click **OK**.

Using Row State Columns

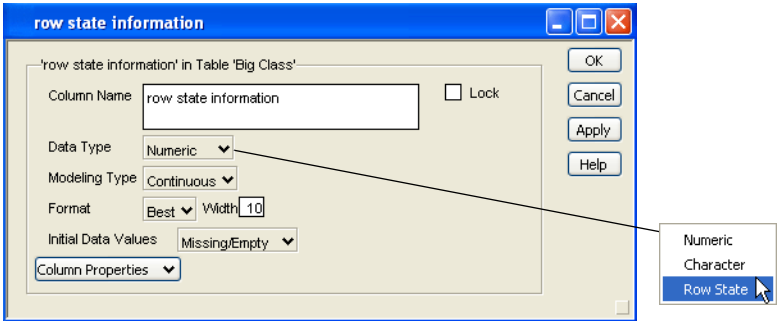
You can create a column that contains only row state information, which stores information about whether the rows are excluded, hidden, labeled, colored, or marked. (See "Assigning Characteristics to Rows and Columns," p. 131, for details.) This column has its own data type and it does not have a modeling type because its values are not used in analyses.

Using row state columns is a two-step process. The first step is to set up the column. Then, add values to the column just as you would if it contained numeric or character data. The sections below describe how to complete these steps.

Step 1: Set Up Row State Columns

1 Create a new column by either double-clicking the top of an empty column, or by selecting **Cols > New Column**.
2 If you double-clicked to create a new column, double-click the column name again.
3 In the window that appears, click the **Data Type** menu and select **Row State**, as shown in Figure 5.40.

Figure 5.40 Select Row State for the Column's Data Type



4 Click **OK**.
5 Add or copy values to the column by following the steps in "Step 2: Add Values to Row State Columns," p. 166.

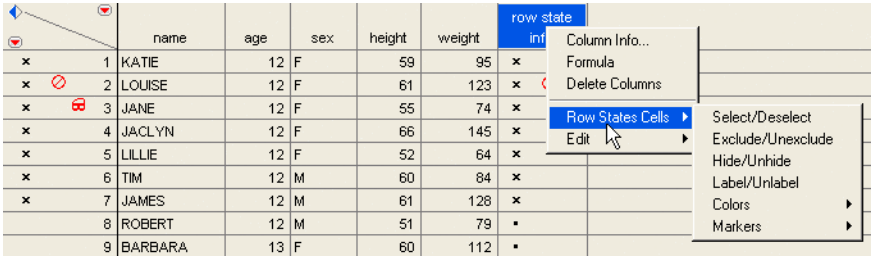
Step 2: Add Values to Row State Columns

After setting up the row column, populate its cells with either new information or with pre-existing row state information. There are two ways to do this: by either creating row state characteristics for the row state column or by copying existing row state information into the column. The sections below describe these two ways.

To create row state characteristics for the row state column

1 Right-click (Ctrl-click on the Macintosh) the row state column name.
2 Select **Row States Cells**. The submenu appears.
3 Select a characteristic to apply to all rows in the column.

Figure 5.41 Applying Row State Characteristics to an Entire Row State Column

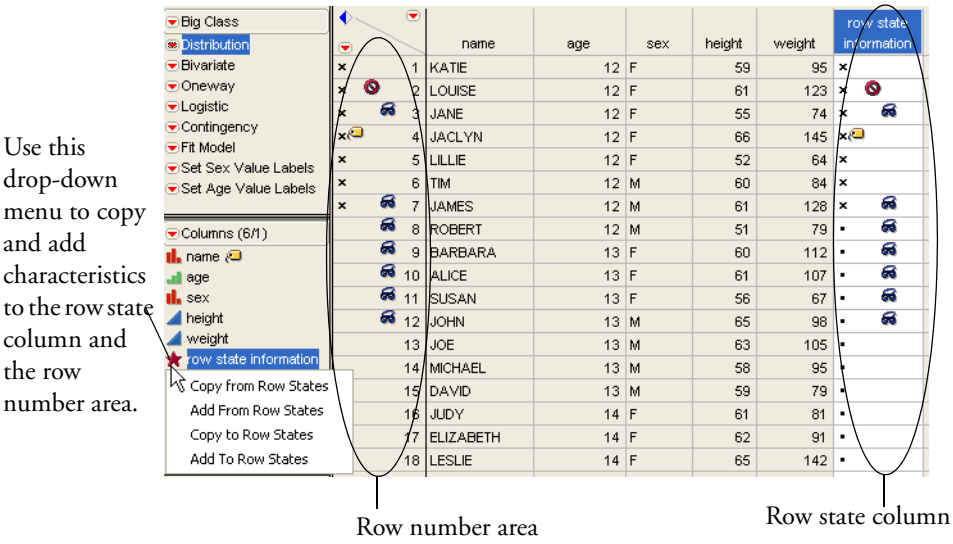


To populate a row state column by copying existing row state information into the column

1 To populate only certain rows in the row state column, highlight those row(s). To populate on all rows in the column, highlight the row state column.

2 Click the star icon (★) beside the column name located in the column panel (to the left of the data grid). The drop-down menu shown in Figure 5.42 appears.

Figure 5.42 Row States Columns and Row State Conditions


Use this drop-down menu to copy and add characteristics to the row state column and the row number area.
Big Class
Distribution
Bivariate
Oneway
Logistic
Contingency
Fit Model
Set Sex Value Labels
Set Age Value Labels
Columns (6/1)
name
age
sex
height
weight
row state information
Copy from Row States
Add From Row States
Copy to Row States
Add To Row States
name age sex height weight row state information
1 KATIE 12 F 59 95
2 LOUISE 12 F 61 123
3 JANE 12 F 55 74
4 JACLYN 12 F 66 145
5 LILLIE 12 F 52 64
6 TIM 12 M 60 84
7 JAMES 12 M 61 128
8 ROBERT 12 M 51 79
9 BARBARA 13 F 60 112
10 ALICE 13 F 61 107
11 SUSAN 13 F 56 67
12 JOHN 13 M 65 98
13 JOE 13 M 63 105
14 MICHAEL 13 M 58 95
15 DAVID 13 M 59 79
16 JUDY 14 F 61 81
17 ELIZABETH 14 F 62 91
18 LESLIE 14 F 65 142
Row number area
Row state column

3 Select one of the following:

- **Copy from Row States** Copies the characteristics from the row number area to the row state column, replacing existing row state values in the column.
- **Add from Row States** Adds the characteristics from the row number area to the row state column, preserving existing row state values in the column.
- **Copy to Row States** Copies the characteristics from the row state column to the row number area, replacing existing active row states.
- **Add to Row States** Adds the characteristics from the row state column to the row number area, preserving existing active row states.

Permanently Highlighting Cells

You can save a highlight in a row state column just like you save other row state characteristics (hide, exclude, color, and so on). This places a "permanent" highlight on a cell. To do this:

1 Right-click a cell and select **Row States Cells > Select/Deselect**.

2 Repeat this for as many cells as you would like to highlight.

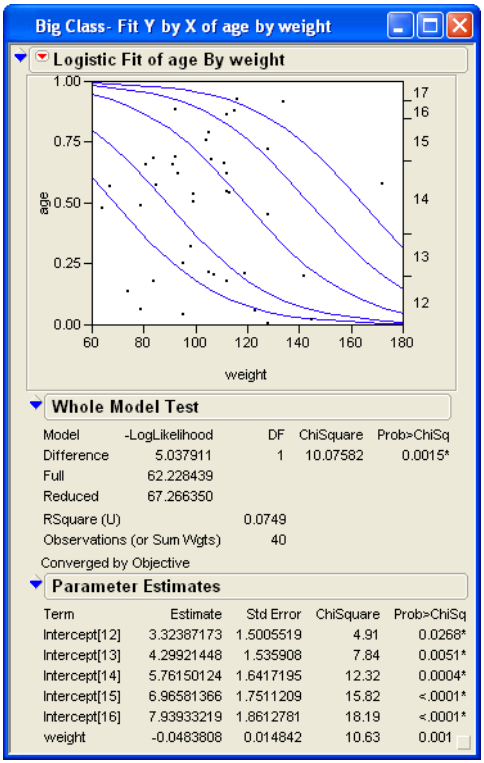
3 To remove the highlight, right-click (Windows) or Ctrl-click (Macintosh) on the cell and select **Row States Cells > Select/Deselect**.

Chapter 6

Output Reports

Using the Report Window

All analyses produce report windows, such as the one shown below.



Reports contain both text reports and graphs. They are designed to be convenient in several ways:

- Individual plots can be resized and text reports can be opened and closed to optimize screen space. (See "Resizing Plots and Graphs," p. 195, and "Showing and Hiding Parts of a Report," p. 173.)
- Plots and text reports can be printed. (See "Printing Reports," p. 177.)
- Context-sensitive help is accessible through the question mark tool. After selecting it, you can click anywhere in a report. (See "Learning About JMP," p. 3.)
- All or part of a report can be copied to other applications, such as Microsoft Word. (See "Pasting Reports into Another Program," p. 177, and "Pasting Reports into Another Program," p. 122.)

This chapter describes features common to all reports in JMP.

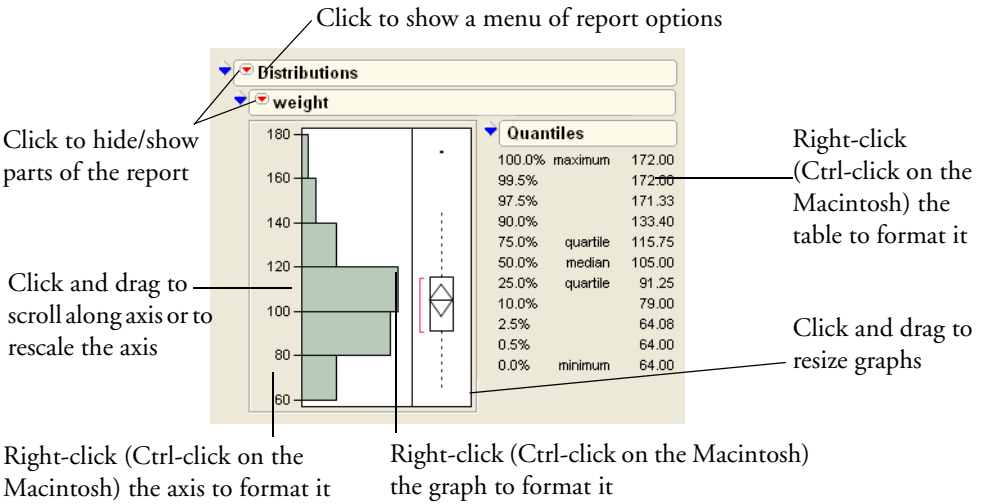
Contents

Editing Reports 171
Accessing General Report Formatting Options 171
Showing and Hiding Parts of a Report 173
Renaming a Report 174
Increasing Font Sizes 175
Saving Results as Column Values 175
Editing Data Table Rows using the Row Editor 175
Understanding the p-value Indicator 176
Printing Reports 177
Pasting Reports into Another Program 177
Adding Options and Working with Analyses 178
Saving Your Steps as a Script 179
Formatting Report Tables 180
Reordering Rows (Sorting) 180
Showing and Hiding Columns 181
Adding Outlines and Borders 181
Changing Numeric Formats and Field Widths 182
Turning a Report Table Into a Data Table 183
Turning a Report Table Into a Matrix 184
Selecting Points in Plots 185
Using Markers 187
Altering Plot and Chart Appearances 195
Resizing Plots and Graphs 195
Changing Line Widths 197
Changing the Background or Histogram Bar Color 198
Displaying Coordinates 199
Scrolling and Scaling Axes 199
Customizing Axes and Axis Labels 200
Changing the Order of Values 205
Customizing Tick Marks and Tick Mark Labels 205
Adding Reference Lines 210
Adding Elements to a Report 211
Adding an Annotative Note 211
Adding Shapes 213
Adding Graphics (Windows and Macintosh Only) 216
Adding and Editing Graphics Scripts 216

Editing Reports

JMP reports are displayed in standard windows with scroll bars and options to resize. They also have other special buttons and menus like those illustrated in Figure 6.1 and those discussed in the following sections.

Figure 6.1 Basics of the Report Window



Note that there are many functions you can use with the hand tool (also known as the grabber tool:) in a report. Here are some examples of the way the hand behaves in graphs and plots:

- Use the hand tool to change the displayed range of axis values:
  - On a *y*-axis, dragging or scales the *y*-axis; dragging scrolls the *y*-axis.
  - On an *x*-axis, dragging scrolls the *x*-axis; dragging or scales the *x*-axis.
- On histograms, use the hand tool to change the number of bars or to shift the boundaries of the bars.
- In all report tables, use the hand tool to click and drag columns for rearranging.

Accessing General Report Formatting Options

Right-click (Ctrl-click on the Macintosh) a disclosure button (on Windows/Linux and ▶▼ on the Macintosh) to show a menu that lets you rearrange the report and gives you control over report outline levels. The resulting menu has the following report formatting options:

Close Closes (hides) that section of the report. This can also be accomplished by clicking the disclosure button (on Windows/Linux and ▶▼ on the Macintosh).

Horizontal (if available) Horizontally aligns the next lower outline levels. By default, most reports are arranged with the outline levels showing vertically with indented outline levels.

Open All Below Opens all outline levels beneath the level where this command is selected, including that level.

Close All Below Closes all outline levels beneath the level where this command is selected, including that level.

Open All Like This Opens all of the same type of reports as the one that is present in the analysis window. If you analyze several variables at a time, or select multiple options on a single analysis, you often have many of the same type report tables and want to open or close them all at once.

Close All Like This Closes all of the same type of reports as the one that is present in the analysis window.

Close Where No Outlines Closes all parts of the report that do not have sublevels. This command is usually used at the top level of the report outline. It is a quick way to see a nesting structure overview of a report.

Append Item Displays a submenu, which lists ways you can add structural items to the report. Items include text, outline title bars, references to other JMP files and windows, a list of all open JMP files, and URLs.

Edit Displays the submenu shown in Figure 6.2, which affect all reports at the outline level where they are used:

Select Highlights all reports for that outline level.

Deselect Deselects all selected reports for that outline level.

Journal Duplicates the report in a separate window titled Journal so you can edit it or append other reports to it. (See "Saving Using the Journal Command," p. 116, for details.)

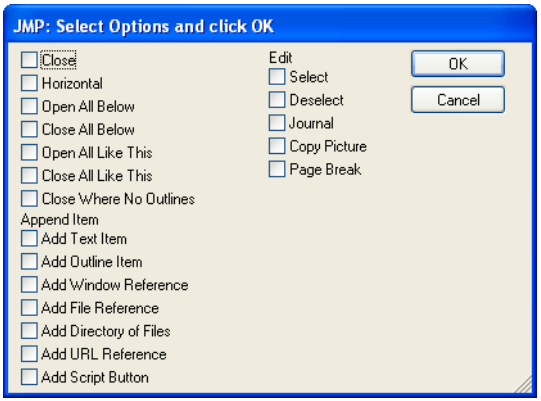
Copy Picture Copies the report to the clipboard. You can then open another application and paste it.

Page Break Inserts a page break for printing purposes.

Show Tree Structure Opens a window that shows the DisplayBoxes that make up the report. This is mainly used by JSL programmers who are manipulating or reading parts of the report.

An alternative way to access these options is to Alt-right-click (Ctrl-Option-click on the Macintosh and Ctrl-Alt-right-click on Linux) the disclosure button (on Windows/Linux and on the Macintosh). This displays a window, as shown in Figure 6.2, with check boxes for commands and options so you can select multiple actions at the same time. You can also do the same for the menu under a red triangle icon.

Figure 6.2 Menu Items in a Window

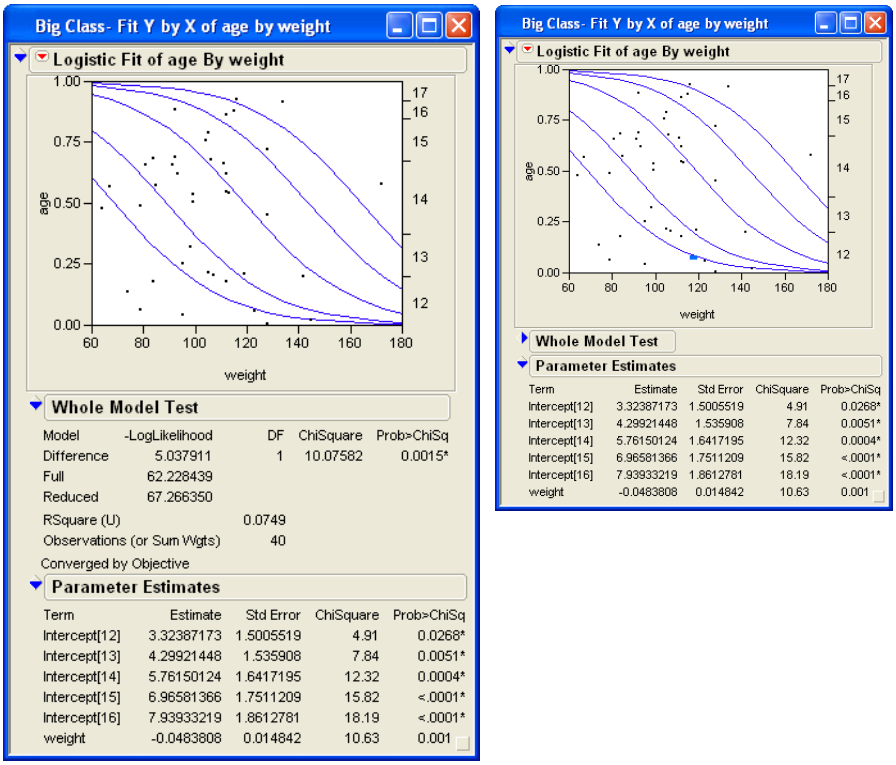


Showing and Hiding Parts of a Report

JMP reports are organized in a hierarchical outline. On a Windows or Linux operating system, each level of the outline has a blue diamond-shaped disclosure button ( ). On the Macintosh, each level of the outline has a gray arrow-shaped disclosure button ( ).

To use the disclosure button, click the disclosure button to open and close that section of the report. In Figure 6.3, the report on the left has the Whole Model Test open, while the report on the right has it closed.

Figure 6.3 Reports With a Section Open (Left) and Closed (Right)

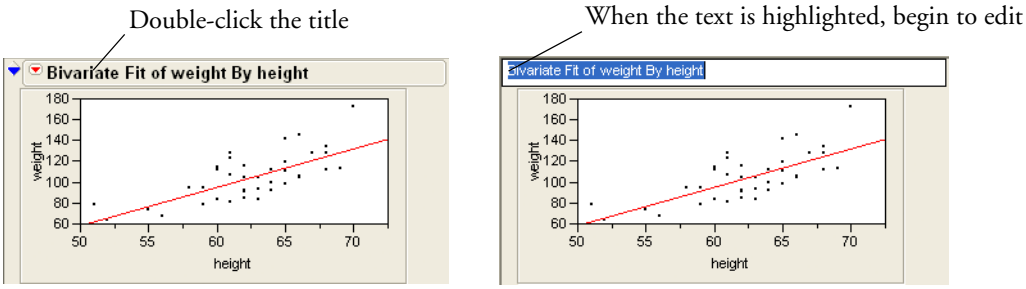


Renaming a Report

To change the title, or name, that appears on the top of a report:

1 Double-click the report title. The cursor becomes a flashing text insertion bar.

2 Edit its title.



Increasing Font Sizes

On Windows and Linux, quickly change the font size JMP uses in reports and data tables by selecting **Window > Font Sizes**. Then choose from one of the submenu items:

Increase Font Size Increases the font size. Select again to increase the font size again.

Decrease Font Size Decreases the font size. Select again to decrease the font size again.

Saving Results as Column Values

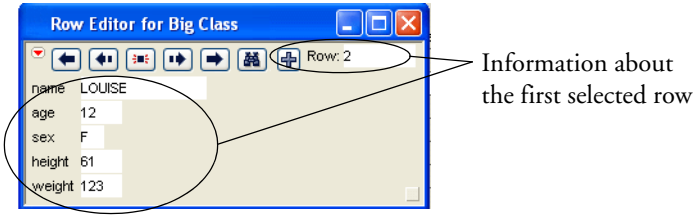
Some reports give you the option of saving parts of the results as a new column in the corresponding data table. To add this new column:

1 After running an analysis and obtaining a report, click the red triangle icon to the left of the report title.
2 From the drop-down menu that appears, select a **Save** option, if available.
3 Select what to save as a new column in the corresponding data table. See "Saving Reports," p. 114, for details.

Editing Data Table Rows using the Row Editor

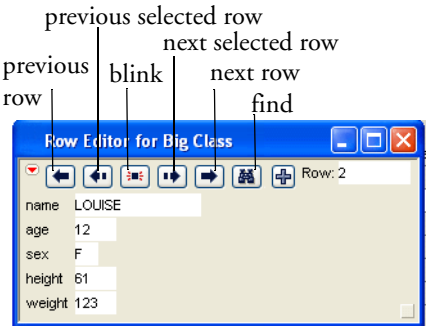
To browse or edit values one row at a time from the report graph:

1 Highlight a point in the report.
2 Right-click (Ctrl-click on the Macintosh) anywhere in a graph.
3 Select **Row Editor**.
4 When the row editor appears, it displays information about the first selected row.



5 Edit the data.
6 Click the arrow buttons to browse through selected rows or the entire data set. Figure 6.4 shows the function of each button.

Figure 6.4 The Row Editor



7 Click the red triangle icon in the row editor to access the following options:

Next Selected Provides the same functionality as the button. It displays information for the selected row that is located after the current one.

Prev (Previous) Selected Provides the same functionality as the button. It displays information for the selected row that is located before the current one.

Next Provides the same functionality as the button. It displays information for the row that is located after the current one, regardless of whether the row is selected.

Prev (Previous) Provides the same functionality as the button. It displays information for the row that is located before the current one, regardless of whether the row is selected.

Save Saves the data table and any changes you have made to it via the row editor.

New Row Creates a new row in the data table.

Find Provides the same functionality as the button. It displays the same window as if you had selected **Rows > Row Selection > Select Where**. Select one of the options on the **Action on currently selected rows menu**, and then highlight the column whose rows you want to select. Type the value for which you want JMP to search. See "Selecting Cells with Specific Values," p. 92, for details.

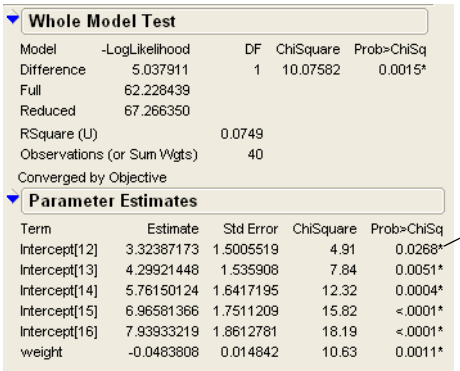
Blink Provides the same functionality as the button. It causes the current row's highlight to flash.

Note: Text in a locked column or a locked data table cannot be edited. See "Locking Columns," p. 143, for details about unlocking a column. See "Locking Tables," p. 83, for details about unlocking a data table.

You can also access the row editor from a data table. See "Using the Row Editor," p. 81, for details.

Understanding the *p*-value Indicator

P-values that are less than 0.05 are frequently significant. In output reports, JMP indicates the significance of these values by placing an asterisk beside them.



Whole Model Test

Model	-LogLikelihood	DF	ChiSquare	Prob>ChiSq
Difference	5.037911	1	10.07582	0.0015*
Full	62.228439			
Reduced	67.266350			
RSquare (U)		0.0749		
Observations (or Sum Wgts)		40		

Converged by Objective

Parameter Estimates

Term	Estimate	Std Error	ChiSquare	Prob>ChiSq
Intercept[12]	3.32387173	1.5005519	4.91	0.0268*
Intercept[13]	4.29921448	1.535908	7.84	0.0051*
Intercept[14]	5.76150124	1.6417195	12.32	0.0004*
Intercept[15]	6.96581366	1.7511209	15.82	<.0001*
Intercept[16]	7.93933219	1.8612781	18.19	<.0001*
weight	-0.0483808	0.014842	10.63	0.0011*

An asterisk indicates that the *p*-value is less than 0.05.

Printing Reports

To print the report in the active window, select **File > Print**. This command displays the standard window for printing. The appearance of the window depends on your operating system and printer driver.

- If you are using a Windows operating system and would like to view the active window in the form it will print before you print it, select **File > Print Preview**. If there is no open window, this command is not available.
- To set printed page characteristics before printing, select **File > Print Setup** (Windows) or **File > Page Setup** (Macintosh) to display the standard window for setting these characteristics. The form of the window depends on your operating system and current printer driver.

To insert a page break for printing purposes:

1 Right-click the disclosure button (on Windows/Linux and on the Macintosh) in the report window.
2 Select **Edit > Page Break**.

Pasting Reports into Another Program

When you need JMP reports or data tables for use in another program, you can save the reports or tables by copying and pasting or dragging and dropping parts of it into another program, such as Microsoft Word or PowerPoint. Then save the document in that application. Note that on Linux, you can copy and paste or drag and drop text but not graphics.

1 Click the selection tool ( ).
2 Click and drag (or Shift-click) to select items in a report window or data table. Clicking near the edge of the report window selects the entire report.
3 Click the selected items and drag them from JMP to the other program. Or, copy the selected items in JMP and paste them into the other program. When you paste an element into another

application, the format used depends on the application into which you paste. If the application has a **Paste Special** command and you use it, you can select a format to use, such as text (.rtf), unformatted text (.txt), picture or Windows metafile (.wmf), bitmap (.bmp), or enhanced picture (.emf).

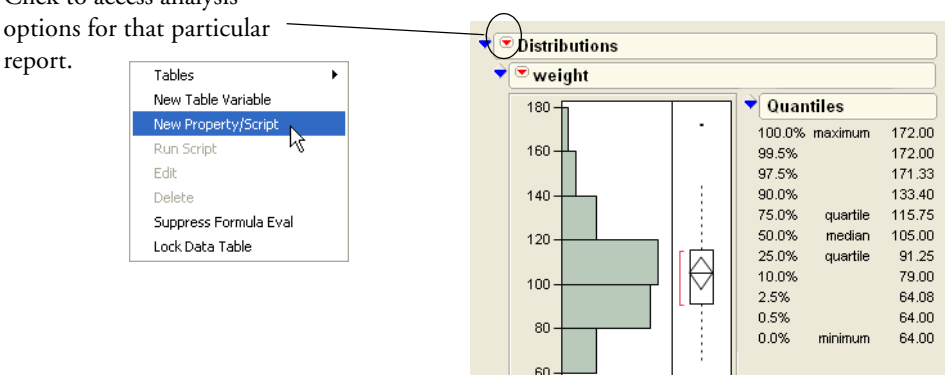
Note: To copy all text (no graphs) from the active report window as unformatted text, select **Edit > Copy As Text**. On the Macintosh, press the Shift key and select **Edit > Copy As Text**. To copy only the graph (no text), right-click the graph and select **Edit > Copy Picture**.

Adding Options and Working with Analyses

How to Access Analysis Options

Click the red triangle icon in a report to display a list of options that apply for that particular report, as shown in Figure 6.5.

Figure 6.5 The Red Triangle Icon



In addition to clicking the red triangle icon, you can also:

- Alt-click (Option-click on the Macintosh and Ctrl-Alt-click on Linux) the red triangle icon, and a panel of all commands and options appears with check boxes so that you can select multiple actions at the same time.
- Ctrl-click (Command-click on the Macintosh and Ctrl-Alt-right-click on Linux) the red triangle icon to broadcast the command you select to all similar reports in the analysis window. For example, if you Ctrl-click the icon in a one-way analysis and select **Means/Anova/t Test**, an analysis of variance is performed for all one-way analyses in the active report window.

Chapters in the *JMP Statistics and Graphics Guide* describe the menus for each statistics and graphics platform.

Rerunning An Analysis

You can redo an analysis and get its report without having to return to the main menu. For example, if you run a bivariate fit, and then alter a value or two in the data table, you could go back to the original report and rerun the analysis from there.

To redo an analysis from the report window:

1 Click the red triangle icon in the report title.
2 Select **Script > Redo Analysis**.

Saving Your Steps as a Script

After completing an analysis and receiving a report, you might want to save the process you used to arrive at the report as a JSL script. You can save the script inside the data table, inside the report, or in a separate script window. To do this, click the red triangle icon in the report title and select **Script.** Then select the **Save Script** option you prefer.

Copy Script Copies the steps taken to arrive at the current report to the clipboard as JSL. You can paste the script into a text editor.

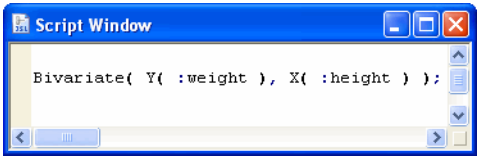
Save Script to Data Table Saves the steps taken to arrive at the current report as a JSL script in the data table. The script appears in the tables panel of the data table. For details, see "The Table Panel," p. 50 and "Creating Scripts," p. 87.

Save Script to Journal Saves the steps taken to arrive at the current report as a JSL script in a journal. (See "Saving Using the Journal Command," p. 116, for details about creating a journal.) From the journal, click the script to run it.

Figure 6.6 The Script Is Added to a Journal

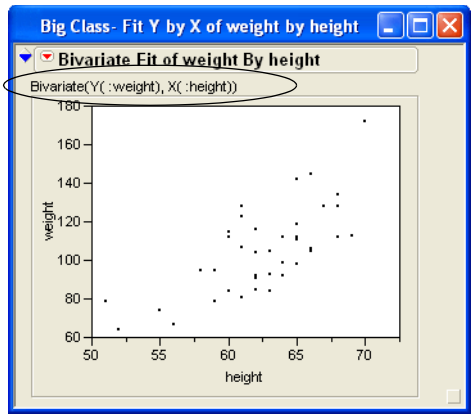
Save Script to Script Window Saves the steps taken to arrive at the current report as a JSL script in a script window, as shown in Figure 6.7.

Figure 6.7 The Script Is Added to a Script Window



Save Script to Report Saves the steps taken to arrive at the current report as a JSL script within the report itself, as shown in Figure 6.8.

Figure 6.8 The Script Is Added to the Report



Save Script for All Objects Saves the steps taken to arrive at the current report—including all by variable assignments—as a JSL script in a script window.

Data Table Window Displays the associated data table as the front-most window.

Non-English versions of JMP can save scripts in either English or your local language. See "Saving Scripts in Different Languages," p. 335.

Formatting Report Tables

There are many ways you can format your report to meet your needs. The sections below detail how to make changes to the textual portions of your reports.

Reordering Rows (Sorting)

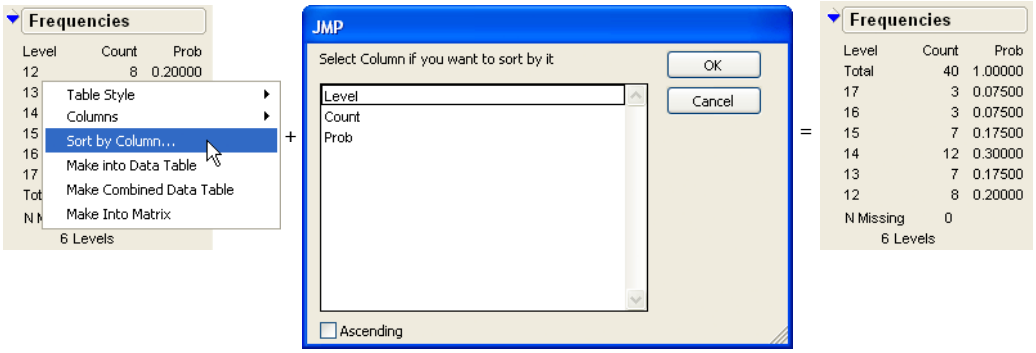
To sort, or rearrange, the rows found in a report table:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a report table.

2 Select **Sort by Column**.

3 From the window that appears, highlight one or more columns as sort variables. Figure 6.9 shows the sequence of sorting a report table.

Figure 6.9 Sorting a Report Table



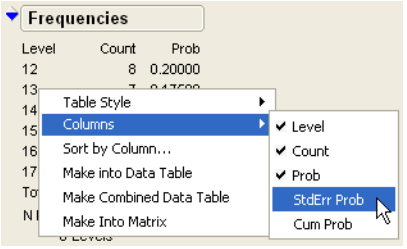
4 (Optional) To display the sorted column in ascending order (instead of the default, which is descending order), click the box beside **Ascending**.

Showing and Hiding Columns

Report tables often have many columns. You can specify which columns you want to view. The table in Figure 6.10 is a Frequencies table showing only the level, count, and probability. The standard error probability and cumulative probability values are hidden. To show or hide columns:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a report table.
2 Select **Columns**.
3 Select a column to show or hide. Columns with checks beside their names will appear in the table (Figure 6.10).

Figure 6.10 Showing and Hiding Columns



Note: Columns whose names begin with a tilde (~), such as **~Bias**, are not applicable to the analysis you ran and will not appear in the table, even if you place checks next to their names.

Adding Outlines and Borders

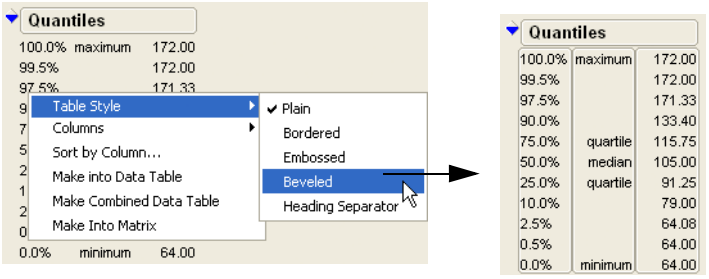
By default, a report table has no outlines to separate rows and columns. You can tailor the appearance and content of the tables. To add outlines and borders:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a report table.

2 Select **Table Style**.

3 Select one of the options to enhance the appearance of the table (Figure 6.11).

Figure 6.11 Table Style Menu and Beveled Table (on Windows)



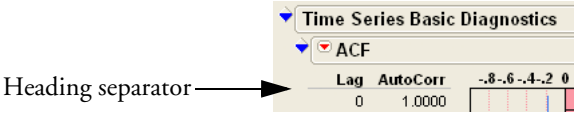
Plain Contains no divider lines or borders.

Bordered Contains a border around the table and divider lines between columns.

Embossed On Windows and Linux, adds a three-dimensional effect to the border and divider lines. On the Macintosh, changes the border from black to gray.

Beveled On Windows, adds a three-dimensional effect and causes the corners of borders to be rounded instead of square. On the Macintosh and Linux, shades the table background gray.

Heading Separator Adds a thin line under the boldface table headings. If there are no headings in the table, the **Heading Separator** setting appears to have no effect.

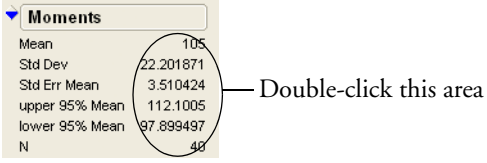


Changing Numeric Formats and Field Widths

By default, JMP picks what it considers the best format for numbers both in reports and in the data table. For long decimals, this format is as wide as will fit in the column. It also truncates trailing zeros. To change this in a report table:

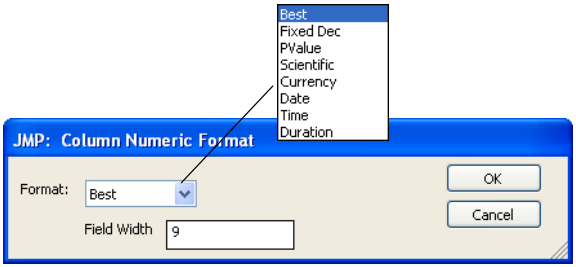
1 Double-click anywhere in a report's numeric column, as shown in Figure 6.12. The Column Numeric Format window appears.

Figure 6.12 Change the Table's Format



2 Select a format from the **Format** drop-down menu, as shown in Figure 6.13.

Figure 6.13 The Format Menu



3 If you select **Fixed Dec**, **Date**, **Time**, or **Duration**, other fields appear. Type in the number of decimals, select the date format, or select the time format from the next box.

4 In the **Field Width** box, type the number of characters you want the column in the report to accommodate. Be sure to type a number that is the largest number of digits you think a value in the column could have.

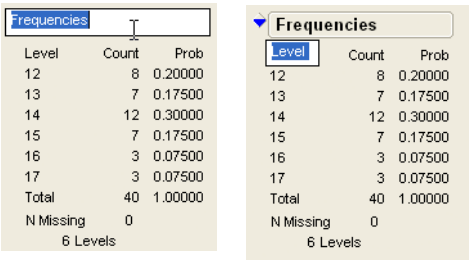
5 Click **OK**, and the column in the analysis table formats accordingly.

Changing Table Names and Column Headings

You can change the name of a report table and a column heading:

1 Double-click the table's name or heading. It is highlighted, as shown in Figure 6.14.

Figure 6.14 Double-Click a Table Name (Left) or Column Heading (Right) to Change It



2 Click it again. The cursor becomes a flashing text insertion bar.

3 Edit its contents.

Turning a Report Table Into a Data Table

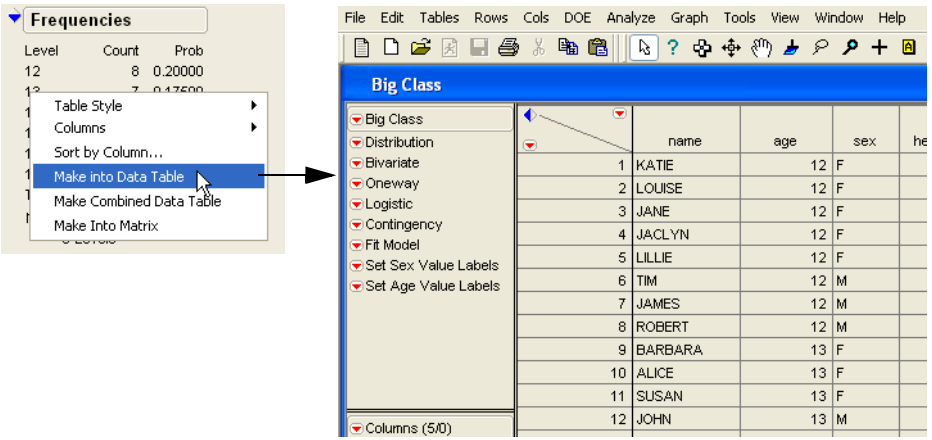
You can create a JMP data table from a report table. The data table in Figure 6.15 is the JMP data table created from the Frequencies table in an output report. To turn a report table into a data table:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a report table.

2 Select **Make into Data Table** to create a data table from the report table.

Select **Make Combined Table** to search the report for other tables like the one you clicked and combine them into a single data table.

Figure 6.15 A Report Table Turned Into a Data Table



Turning a Report Table Into a Matrix

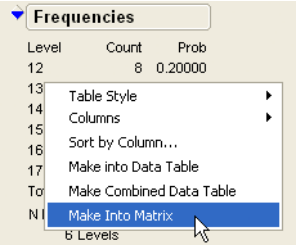
You can create a JMP matrix from a report table. For example, when working with JMP Scripting Language (JSL), you might want to access a report's table that has been stored into a JSL variable. Or, you might want to store a report table's values into a table property as either a table property or as a JSL assignment, which is stored within the data table and is accessible via a script or the formula editor.

To store a table in matrix form into a global variable, into a table property, or into a table property as an assignment:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a report table.

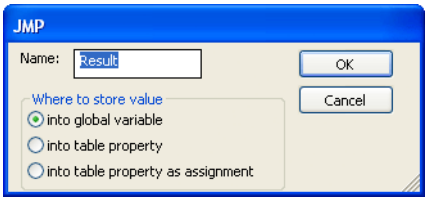
2 Select **Make into Matrix**, as shown in Figure 6.16.

Figure 6.16 Select Make Into Matrix



3 In the window that appears, tell JMP how you want to store the table, as shown in Figure 6.17.

Figure 6.17 Select into global variable



4 (Optional) Rename the variable or property by typing a new name into the box beside **Name**.

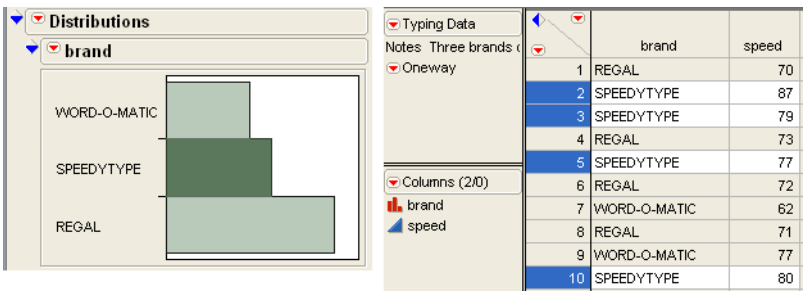
Selecting Points in Plots

To select a point in a plot, click the point with the arrow cursor. This selects the point as well as the corresponding row in the current data table. To keep all points selected, press the Shift key while you click new points. A point's label appears when you place the cursor over the point with or without clicking.

Selecting Rows and Columns in Plots, Charts, and Graphs

All graphs and plots that represent the same data table are linked to each other and to the corresponding data table. When you click points in plots or bars of a graph, the corresponding rows highlight in the data table. The example in Figure 6.18 shows a histogram with the SPEEDYTYPE bar highlighted, and the corresponding rows highlighted in the table. You can also extend the selection of bars in a histogram by pressing Shift and then clicking them.

Figure 6.18 Highlighting Rows In a Histogram



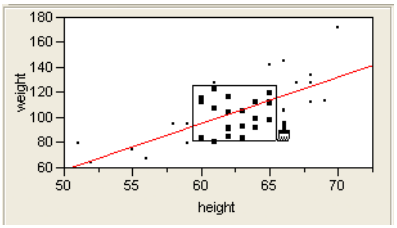
Selecting a Rectangular Area of Points

You can select all points that fall in a rectangular area using the arrow cursor. Click and drag the arrow to highlight points. Alternatively, you can use the brush tool. As you move the brush over the graph, points that fall within the rectangle are selected. Any points marked in the data table as hidden are not selected. (See "Hiding Rows and Columns," p. 132.)

To select points using the brush tool:

1 Click the brush tool ( ) in the toolbar.
2 Click and hold the cursor (now brush-shaped) in a plot. A rectangle appears.
3 Move the rectangle over points. As it passes over them, they appear larger and are highlighted both in the plot and in the active data table.

Note: To keep all points selected as you move the brush-shaped cursor over points, press the Shift key before you click in the plot.



4 Release, and the points within the rectangle remain selected.

Optional ways of using the brush tool include:

- To change the size of the selection rectangle, press the Alt key (Option key on the Macintosh and Alt-Shift on Linux) before you click in the plot. This shape acts like a slicing tool that can traverse and highlight slices of points across either axis.
- If you press the Ctrl key (Command key on the Macintosh) and drag the brush tool, the selection status of points within the rectangle continuously inverts. This causes selected points and row numbers in the data table to flash.
- If you Ctrl-Alt-drag (Command-Option-drag on the Macintosh) with the brush tool and then release (*push* the rectangle), the rectangle bounces in the frame. The speed and direction you push (or drag) the cursor determines the speed and direction of the bouncing rectangle. Click the report to stop the rectangle.

Selecting an Irregular-Shaped Area of Points

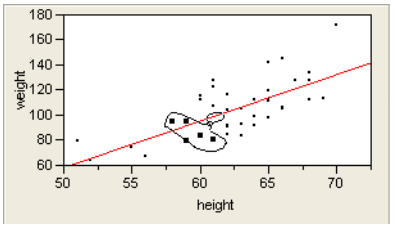
You can use the lasso tool to select points that fall in an irregular-shaped area. Any points marked in the data table as hidden are not selected. (See "Hiding Rows and Columns," p. 132.)

To select points within an irregular-shaped area:

1 Click the lasso tool ( ) in the toolbar.
2 Click and hold the cursor (now lasso-shaped) in a plot.

Note: To keep all points selected as you drag the lasso around several sets of points, press the Shift key before you click in the plot.

3 Drag the lasso around any set of points.



4 Release, and JMP automatically closes the lasso and highlights the points within the enclosed area.

Using Markers

Markers are points on a graph that represent data. Once they are changed from their default setting, they also appear next to rows in the data table. The following sections show you how to change marker shape, size, color, and so on.

Changing Marker Shape

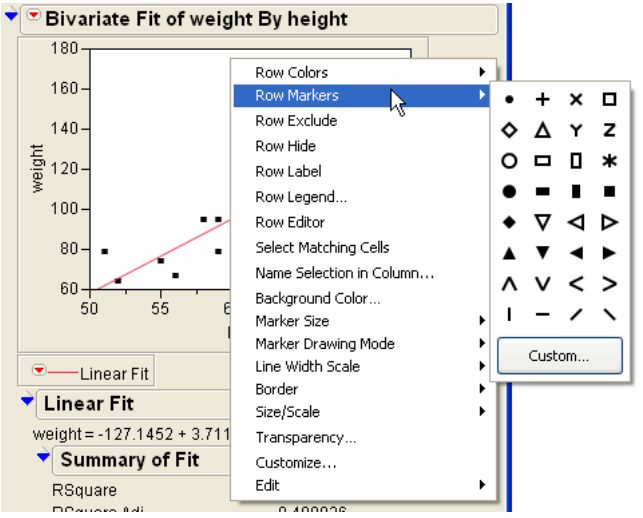
You can assign a character from the JMP markers palette to replace the standard points in scatterplots and spinning plots. These markers also appear next to row numbers in the data table.

1 Highlight one or more markers whose shape you would like to change.

2 Right-click (hold the CONTROL key and click on Macintosh) anywhere in the graph. In a histogram, right-click the box plot area on the right.

3 Select **Row Markers**. The menu in Figure 6.19 appears.

Figure 6.19 Row Markers



4 Select a marker shape from the options that appear, or click **Custom** to enter a character to use as a

marker.

Changing Marker Colors

You can assign any color to highlighted rows. When you do this, the points in scatterplots and spinning plots appear in the color you select from the **Colors** palette. The active color assigned to a row appears next to the row number in the data grid.

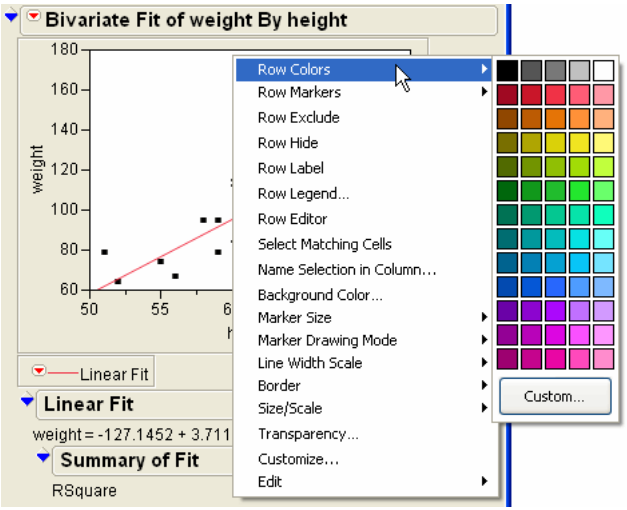
To change the color of markers (points) on a graph:

1 Highlight one or more markers whose color you would like to change.

2 Right-click (hold the CONTROL key and click on Macintosh) anywhere in a graph. In a histogram, right-click the box plot area on the right.

3 Select **Row Colors**. The menu in Figure 6.20 appears.

Figure 6.20 Row Colors



4 Select one of the colors, or click **Custom** to apply a custom color.

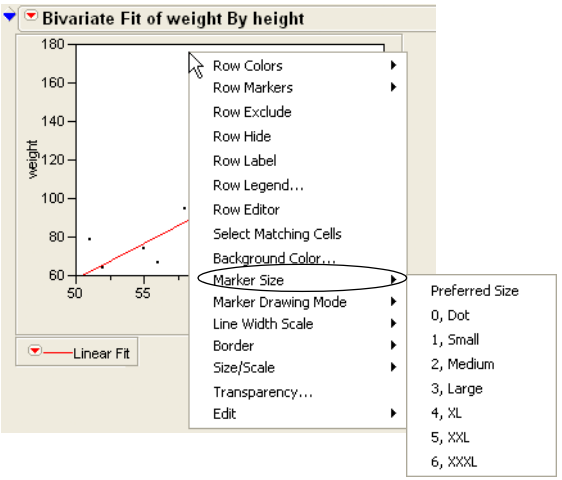
Changing Marker Size

To increase or decrease the size of markers (points) on a graph:

1 Right-click (hold the CONTROL key and click on Macintosh) anywhere in a graph. Hold the CTRL key and right-click (hold the ⌘ and CONTROL keys and click on the Macintosh) to broadcast the command and apply it to all plots of the same type located in the same window. In a histogram, right-click the box plot area on the right.

2 Select **Marker Size**. The menu in Figure 6.21 appears.

Figure 6.21 Select a Marker Size



3 Select one of the marker sizes listed. **Preferred Size** is the size that JMP estimates to be the best size for the graph.

Changing the Marker Drawing Mode and Transparency

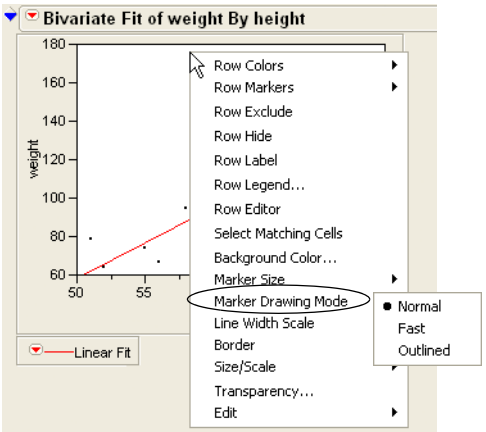
When working with a large number of markers on a graph, the markers can appear crowded. If this is the case, you might need to alter the transparency to gain a better view. Altering the transparency might also affect the marker drawing mode, which is the mode JMP uses when it refreshes a report window. As it draws markers on a plot, it uses one of two speeds: normal or fast.

To change the marker drawing speed:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a graph. In a histogram, right-click the box plot area on the right.

2 Select **Marker Drawing Mode**. The menu in Figure 6.22 appears.

Figure 6.22 Select a Marker Drawing Mode



3 Select either **Normal** or **Fast**.

Normal If JMP is in normal drawing mode and the number of markers in a graph are more than the specified threshold number, JMP automatically switches to fast mode. See "Marker Drawing Speed Threshold," p. 341, for details about setting the marker threshold.

Fast Graphs displaying a large number of markers will appear faster if you set the marker drawing speed to **Fast**. Note that when the drawing speed is set to **Fast**, marker size reverts to **Preferred Size** and marker transparency settings revert to the default opaqueness.

Note: Information about the Outlined selection in the Marker Drawing Mode menu appears in the section "Adding Outlines Around Markers," p. 190.

Adding Outlines Around Markers

You can add a black outline, or frame, to markers in a plot. Outlined markers are available at the medium, larger, XL, XXL, and XXXL marker size. (See "Changing Marker Size," p. 188, for details.)

To add outlines:

1 Right-click a plot or graph.
2 Select **Marker Drawing Mode**, as shown in Figure 6.22.
3 Select **Outlined**.

To use an outline effectively, it is best if your marker is a color other than black.

To change marker colors:

1 Highlight the markers whose color you want to change.
2 Right-click (Ctrl-click on the Macintosh) anywhere in the graph.
3 Select **Row Colors**.
4 Select a marker color from the options that appear. The outline appears on highlighted points and rows.

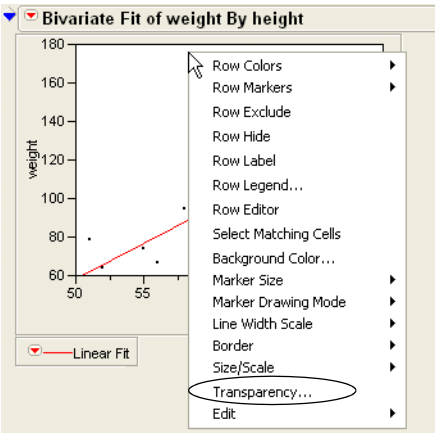
Specifying Marker Transparency

You can change the transparency of markers (points) on a graph. For example, this enables you to control the visibility of overlapping points.

Note that marker transparency settings revert to the default opaqueness and marker size reverts to **Preferred Size** when the drawing speed is set to **Fast**.

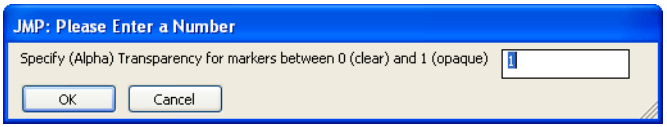
To adjust markers' transparency:

1 Right-click anywhere in a graph. In a histogram, right-click the box plot area on the right.



2 Select **Transparency**. The window shown in Figure 6.23 appears.

Figure 6.23 Transparency Window



3 Type the level of transparency you want the markers (points) to have on the graph. A value of 1 indicates total opaqueness, while 0 indicates invisibility. Values between 1 and 0 are semi-transparent.

4 Click **OK**.

Excluding and Hiding Markers

Using the **Exclude/Unexclude** command, you can exclude highlighted rows from statistical analyses. Data remain excluded until you select **Rows > Exclude/Unexclude** for those highlighted rows.

Warning: Excluded data are not automatically hidden in plots even though they are excluded from calculations in text reports and graphs.

Using the **Hide/Unhide** command, you can suppress (hide) the appearance of highlighted points in scatterplots. For example, you can exclude points from analysis and then hide those same points in scatterplots. The data remain hidden until you select **Rows > Hide/Unhide** for highlighted hidden rows.

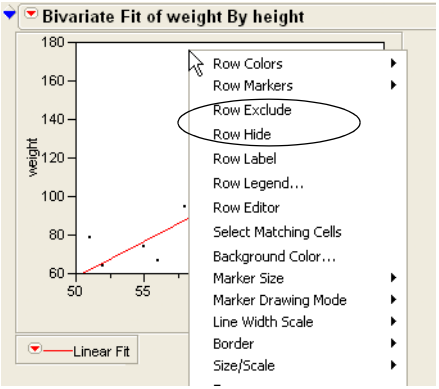
Warning: Hidden points are not automatically excluded from statistical computations that affect text reports and graphs, even though they are not displayed in the plots. To exclude hidden observations from analyses, you must highlight them and select **Rows > Exclude/Unexclude** characteristic.

To exclude or hide markers (points) from analyses:

1 Highlight the marker(s) you would like to exclude or hide.

2 Right-click (Ctrl-click on the Macintosh) anywhere in a graph.

3 Select **Row Exclude** or **Row Hide**.



Adding Labels to Markers

When you position the arrow cursor over a point in a plot, the point's label appears. By default, the label is the row number. There are two ways you can customize the label:

- You can change the label so it displays values found in one or more columns instead of the row number.
- You can enable the label to appear always, not just when you position the cursor over points.

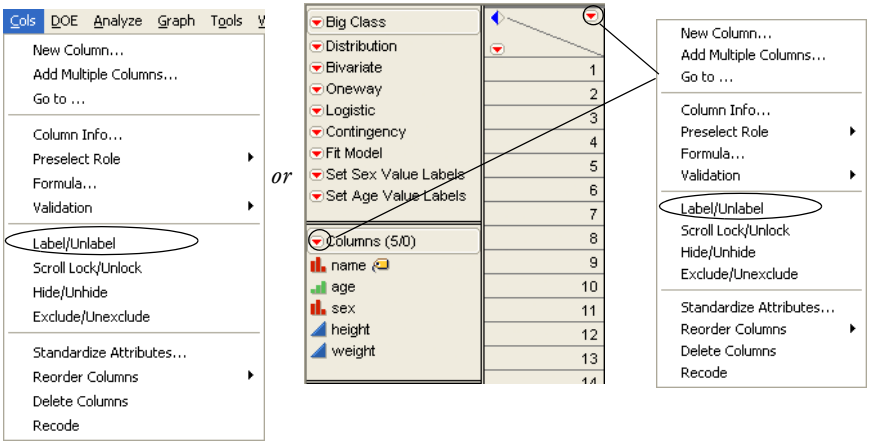
To change the label so it displays values found in one or more columns instead of the row number:

1 In the data table, highlight the column(s) whose values you want to appear as the label in plots.

2 Select **Label/Unlabel** from one of the following places, as shown in Figure 6.24:

- the **Cols** menu in the main menu
- the red triangle icon in the columns panel
- the red triangle icon in the upper right corner of the data grid

Figure 6.24 Different Ways to Access Column Characteristic Commands

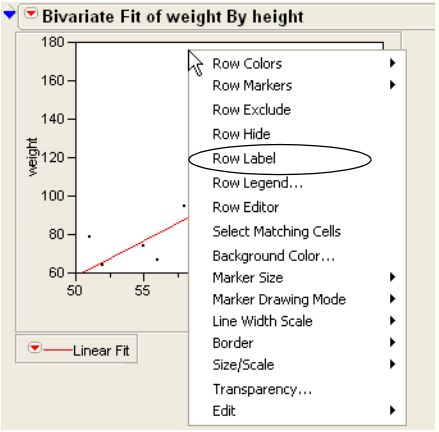


A label, or yellow tag, icon ( ) beside the column name in the columns panel indicates that points on plots will be identified by the column value. If there are multiple labeled columns, their values appear on plots separated by a comma. Data remain labeled until you highlight the column and select **Label/Unlabel** again.

To enable the label to appear always, not just when you position the cursor over points:

1 Highlight the point(s) whose label you want to always appear in plots.
2 Right-click (Ctrl-click on the Macintosh) anywhere in a graph. In a histogram, right-click the box plot area on the right.
3 Select **Row Label**, as shown in Figure 6.25.

Figure 6.25 Select Row Label



A label, or yellow tag, icon ( ) beside the row number in the data table indicates that points on plots corresponding to the row will appear with a label.

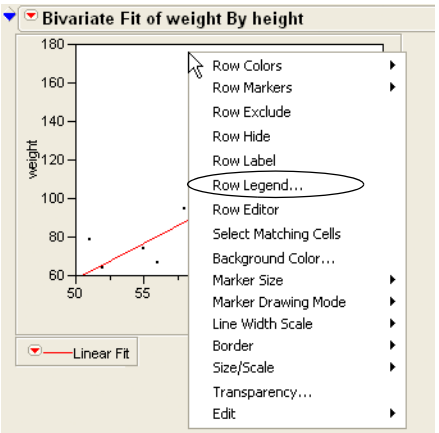
Changing Marker Shape or Colors Based On Values

In some plots, you can change marker shapes and/or colors based on the values of points by adding a *row legend.* It is called a row legend because JMP automatically inserts a legend using row color or row marker settings (Figure 6.28). When you assign markers or colors in this way, it assigns the characteristic(s) to all points in a graph, regardless of what points you have selected, and all previous marker and color settings are overwritten.

To add shapes or colors based on marker values:

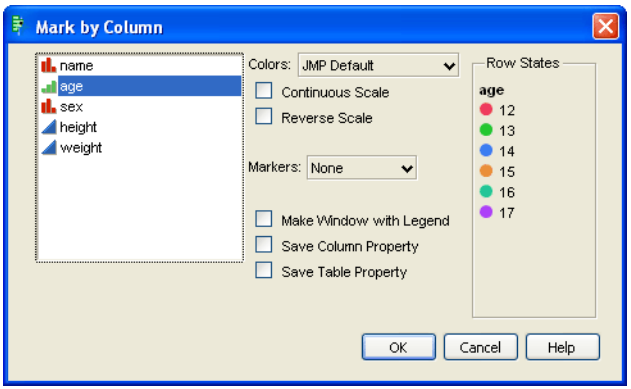
1 Right-click (Ctrl-click on the Macintosh) anywhere in a graph. In a histogram, right-click the box plot area on the right.
2 Select **Row Legend**, as shown in Figure 6.26.

Figure 6.26 Select Row Legend



3 In the window that appears (Figure 6.27), highlight the column whose values you want to color and/or mark. A preview of the legend is shown on the right.

Figure 6.27 Adding a Row Legend



4 Refine your row legend using the following options:

Colors lets you choose among several pre-defined color schemes.

Continuous Scale Assigns colors on a spectrum that corresponds to the ascending or descending order of the values. Use this option when the highlighted column contains continuous values. JMP assigns colors in the order of pink, red, yellow, yellow-green, light blue, and blue to the numbers in the order of largest to smallest. Pink and red are the high values while light blue and blue are the low values.

Note that colors or markers can be reused if there are more values than available colors or markers.

Reverse Scale reverses the scale of colors.

Markers lets you choose among several marker schemes.

Make Window with Legend Includes a legend in the report window that tells you what colors and shapes correspond to which value.

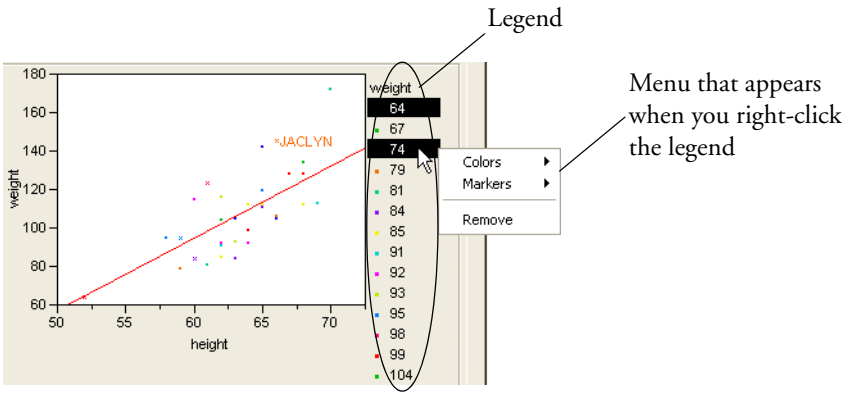
Save Column Property adds a column property that preserves the selected color and marker configuration.

Save Table Property adds a table property that preserves the selected color and maker configuration.

Removing the Legend

After you make the legend, right-click it to change the colors and the markers or to remove the legend. To remove colors and/or markers, highlight the row(s) in the data table and select **Rows > Clear Row States** (Figure 6.28).

Figure 6.28 Right-Click the Legend to Remove Legend



Altering Plot and Chart Appearances

There are many ways you can format your report to meet your needs. The sections below detail how to make changes to the graphical portions of your output reports.

Resizing Plots and Graphs

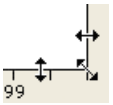
There are two main ways to resize plots and graphs: using the click and drag method, and resizing it according to pixel size.

Using Click and Drag

To resize a plot or graph using the click and drag method:

1 Place the cursor on the right edge, bottom edge, or lower right corner of the plot frame. The cursor changes to a small double-arrow pointer, as shown in Figure 6.29.

Figure 6.29 Resizing a Plot or Graph



2 Click and drag to change the size of the plot. When you resize, the height and width of all plots in that frame adjust independently of other frames in the same report window. Use the table below to adjust the plot how you want it:

Action	Instructions
Adjust the plot frame but preserve the proportions (aspect ratio)	Press the Shift key and click and drag the corner of the frame.
Adjust a plot in 8-pixel increments	Press the Alt key (Option key on the Macintosh) and click and drag the corner of the frame.
Adjust all plots of the same type simultaneously	Press the Ctrl key (Command key on the Macintosh) and click and drag the corner of one of the plots. For example, if you do this for one scatterplot, all scatterplots in the window resize together and the mosaic plots are unchanged.

Specifying Size in Pixels

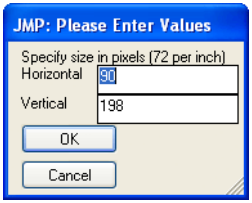
To resize a plot or graph to a specific pixel size:

1 Right-click (Ctrl-click on the Macintosh) the plot or graph.

2 Select **Size/Scale**. To enter the number of pixels for the frame's height and width, select **Frame Size**. Select **Size to Isometric** when the *x*- and *y*-axes are measured in the same units and you want distances on the graph to be represented accurately regardless of direction.

3 Enter the desired measurements in pixel amounts, as shown in Figure 6.30.

Figure 6.30 Specify the Desired Size



Zooming In and Out

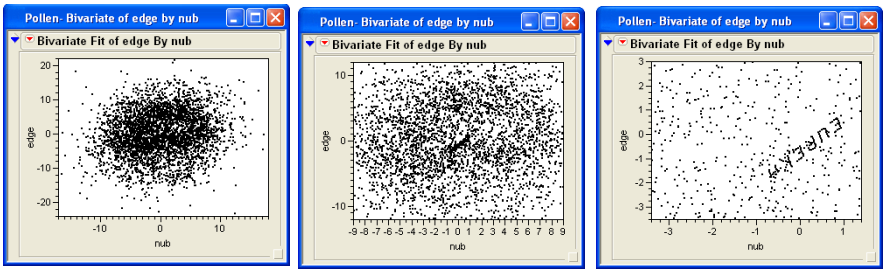
The magnifier ( ) lets you automatically zoom in on any area of a plot. When you click the magnifier, the point or area where you click becomes the center of a new view of the data. The scale of the new view enlarges, giving you a closer look at interesting points or patterns. You can:

- Click and drag the magnifier to focus in on a particular region of the plot.
- On a ternary plot, drag the magnifier to zoom the triangular axes.
- Zoom repeatedly to look closer at the data.
- Ctrl-click once to return to your previous state before the last zoom.
- Double-click or Alt-click the magnifier to restore the original plot.

The example in Figure 6.31 dramatically illustrates the magnifier using Pollen.jmp. To follow this example, open Pollen.jmp from the Sample Data folder that was installed when you installed JMP.

In this example, the data were devised with a hidden pattern (message) buried in over 3,800 points. Selecting **Analysis > Fit Y by X** displays the whole table as the dense cloud shown to the left in Figure 6.31. Clicking the magnifier twice produces the plot in the middle, and clicking twice more reveals the surprise message shown in the plot on the right.

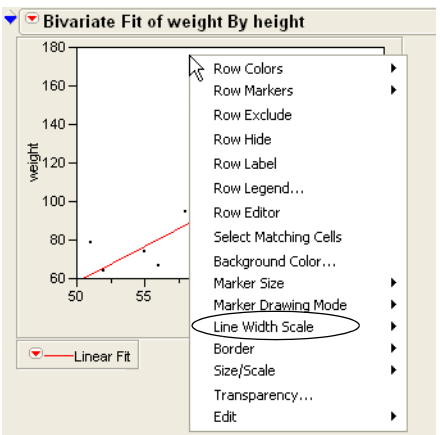
Figure 6.31 Example of Zooming with the Magnifier Tool



Changing Line Widths

After fitting a line to a graph, or producing a graph with a line already present, you can adjust the width of the line:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a graph.



2 Select **Line Width Scale**.

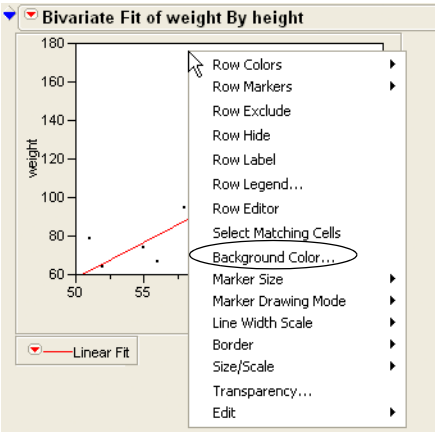
3 Select to increase the current line width one to three times its default width. Or, select **Other** and

specify a larger or smaller number. Select **Scale with Font** to increase the line size as you increase the display font size using **Window > Font Sizes** (Windows and Linux) and **View > Make Text Bigger/ Smaller** (Macintosh).

Changing the Background or Histogram Bar Color

To change the background color of any graph:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a graph. In a histogram, right-click the box plot area on the right.



2 Select **Background Color**.

3 On the Macintosh, click a color on the circle to select a pre-set color, and use the slider on the right of the circle to increase or decrease the intensity of the color.

On Windows and Linux, click a color square from the **Basic colors** area to select a pre-set color, or create a custom color.

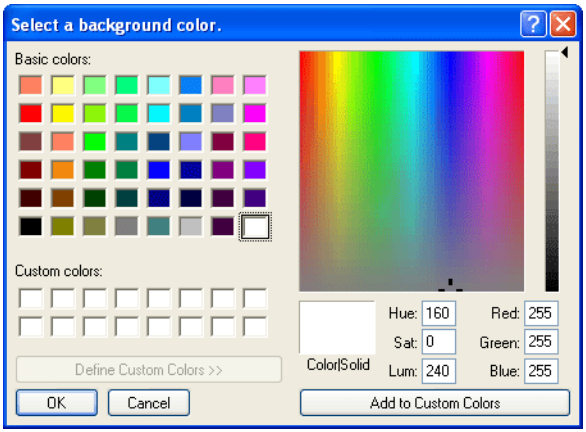
Creating a custom color (Window and Linux only)

1 Click a color band from the large color area on the right of the window. Or, if you know the values of the color you would like to use, type the **Red**, **Green**, and **Blue** values.

2 Use the slider on the right of the large color area to increase or decrease the intensity of the color. If you know the intensity of the colors you would like to use, type the **Hue**, **Sat.** (Saturation), **Lum.** (Luminance).

3 Click **Add to Custom Colors** (Figure 6.32). The color is added to an empty square in the **Custom colors** area.

Figure 6.32 Background Color Options (Windows)

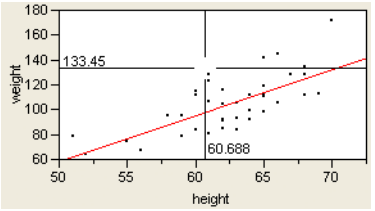


To change the color of the bars in a histogram:

1 Right-click (Ctrl-click on the Macintosh) anywhere in a histogram and select **Histogram Color**.
2 Click a color square from the color area.

Displaying Coordinates

You can measure points and distances in graphs, or easily find the exact value, or coordinates, of points and distances on plots and graphs. To do this, click the crosshairs tool (+), and then click and hold anywhere on a graph. The coordinate values appear where the crosshairs intersect the vertical and horizontal axis as you drag the crosshairs within a plot.



On a fitted line or curve, the crosshairs identify the response value for any predicted value. On a ternary plot, this tool displays triangular crosshair lines.

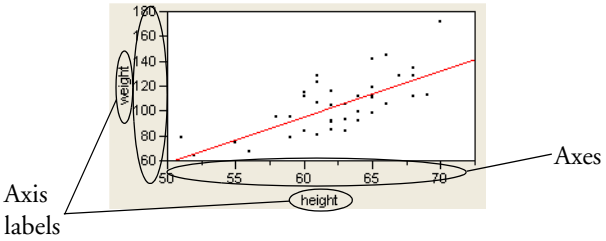
Scrolling and Scaling Axes

The hand tool (also known as the grabber tool) ( ) provides a way to change the axes and view of a plot:

- On a *y*-axis, dragging or scales the *y*-axis; dragging scrolls the *y*-axis.
- On an *x*-axis, dragging scrolls the *x*-axis; dragging or scales the *x*-axis.

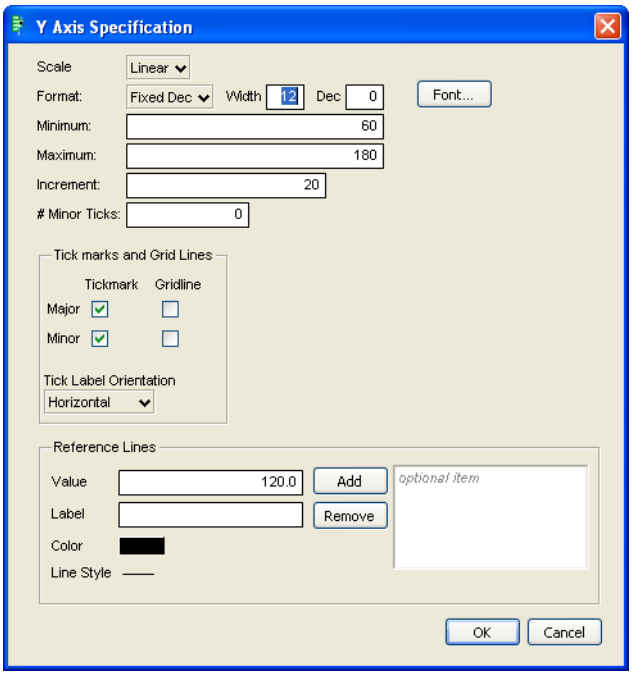
Customizing Axes and Axis Labels

Double-click a numeric axis to customize it using the Axis Specification window. Or, right-click the axis area and select **Axis Settings** to access the window.



Customization features in the window depend on the data type of the axis and the specific platform JMP uses to create the plot or chart. Figure 6.33 shows a typical Axis Specification window for numeric axes.

Figure 6.33 The Axis Specification Window for a Numeric Axis



The following sections describe how to use the axis specification window and what tasks you can accomplish with it.

Changing the Axis Scale Type

When viewing a graph with a numeric axis, you can change the axis scale:

1 Double-click a numeric axis. Or, right-click and select **Axis Settings**. The Axis Specification window appears.

2 Select a scale type: either linear or log.

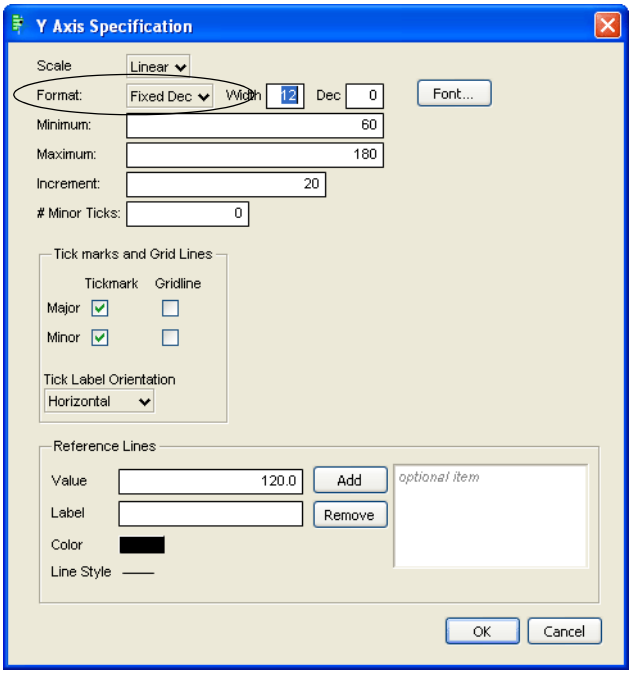
To set a default scale type for a variable, which avoids making this change every time you run an analysis, see "Changing Columns' Default Axis Settings," p. 152.

Changing the Numeric Format of an Axis

For plots and charts that contain a numeric axis area, you can change the format of the axis. To change the numeric format while viewing a graph:

1 Double-click a numeric axis. Or, right-click and select **Axis Settings**. The Axis Specification window appears.

2 In the box beside **Format**, use the drop-down menu to select an option. See "Numeric Format Options," p. 63, for details.



3 If you selected:

- **Date** or **Time** from the **Format** drop-down menu in the previous step, use the drop-down menu to the right of the selection you just made to select date increments for tick marks. See "Numeric Format Options," p. 63, for descriptions of options. You will also need to specify the format of the increments, as described in "Changing the Axis Increments," p. 202.
- **Fixed Dec** from the **Format** drop-down menu in the previous step, a text box appears beside the **Format** box. Type the number of decimal places you want JMP to display.

Note: When you change the numeric format of an axis, you do not change the numeric format of the way the values appear in the corresponding data table. To change the way a date or time appears in a data table, see "Choosing Numeric Formats," p. 61.

Selecting a date interval from the date increment drop-down menu divides the JMP date (number of seconds) into the appropriate units to give the plot scale you want for your data. The date axis must be a column with a JMP date value and appear in the Axis Specification window in the date format found in the Column Info window. However, you can use the Axis Specification window to format the date any way you want it to be displayed in the plot.

Establishing the Minimum and Maximum Axis Values

For plots and charts that contain a numeric axis area, you can change the minimum (**Min**) and maximum (**Max**) values you want the graph to display.

To change the minimum and maximum axis values while viewing a graph:

1 Double-click a numeric axis. Or, right-click and select **Axis Settings**. The axis specification window appears.

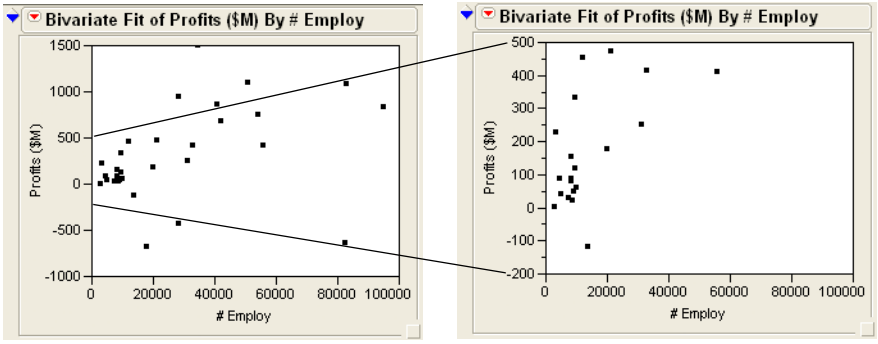
2 Type in a value for the minimum (**Min**) and maximum (**Max**) values you want the graph to display.

You can restore the default minimum and maximum axis settings of a numeric axis by right-clicking a numeric axis and selecting **Revert Axis**.

To set a default minimum and maximum axis value for a variable, which avoids making this change every time you run an analysis, see "Changing Columns' Default Axis Settings," p. 152.

The example on the right in Figure 6.34 is an enlargement of the point cluster that shows between -200 and 500 in the plot to the left. The enlarged plot is obtained by reassigning the maximum and minimum axis values and changing the number of minor tick marks. (See "Adding Minor Tick Marks," p. 207, for details.)

Figure 6.34 Rescale Axis to Enlarge a Plot Section



Changing the Axis Increments

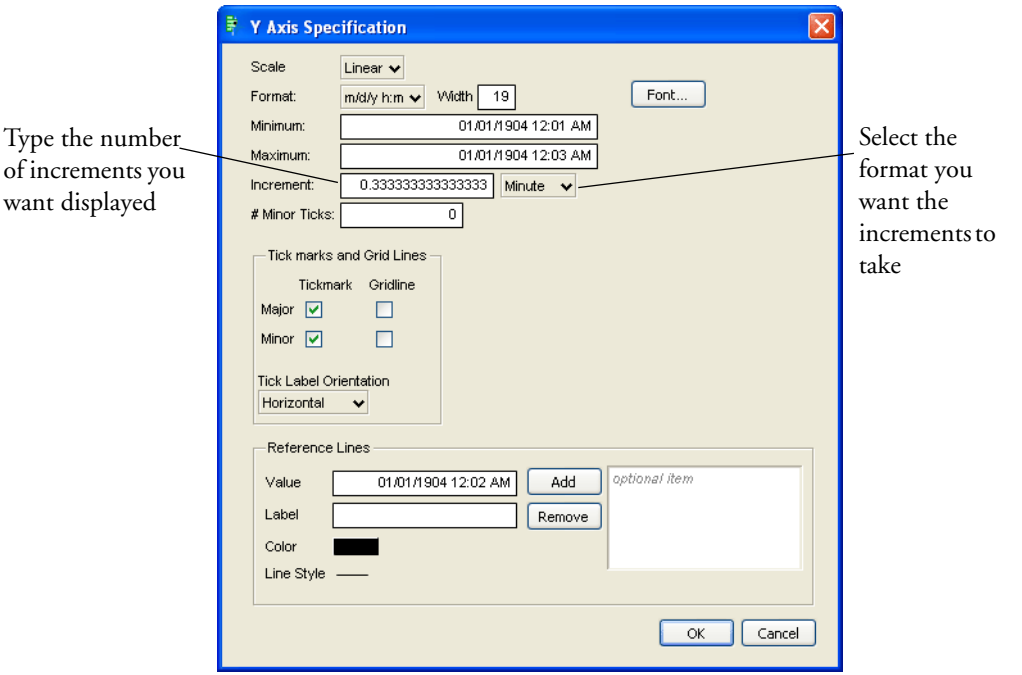
While viewing a graph, you can change the axis increments:

1 Double-click a numeric axis. Or, right-click a numeric axis and select **Axis Settings**. The Axis Specification window appears.

2 In the text box beside **Increment**, type the number of increments you want displayed.

3 If the format of the axis is **Date** or **Time** (as shown in the **Format** drop-down menu), there will be another drop-down menu that appears beside **Increment**. (See Figure 6.35.) From that box, select which format you want the increments to take.

Figure 6.35 Changing Axis Increments



To set a default axis increment for a variable, which avoids making this change every time you run an analysis, see "Changing Columns' Default Axis Settings," p. 152.

Adding and Removing Axis Labels

You can add or remove labels in a numeric axis. To add an axis label:

1 Right-click a numeric axis and select **Add Axis Label**.

2 Type a name for the axis label. The axis area enlarges to hold the number of label lines you enter.

This command can be used multiple times to add multiple labels. To edit the label after it has been added to the axis, click it and it will turn into an edit box.

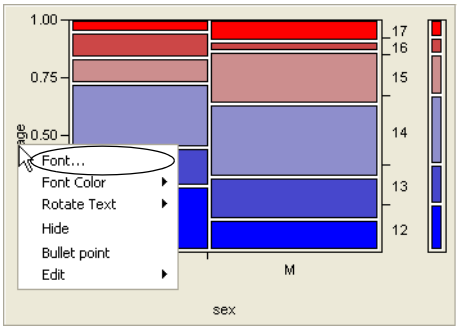
To remove an axis label, right-click a numeric axis and select **Remove Axis Label**. The last label added is removed.

Changing Axis Label Font

You can modify the axis label font on any axis type. When you modify it, your change only applies to the active graph. To set the default axis label font, see "Customizing Fonts," p. 344.

To change the current font type and size:

1 Right-click an axis label.



2 Select **Font**.
3 Make your selections in the window.

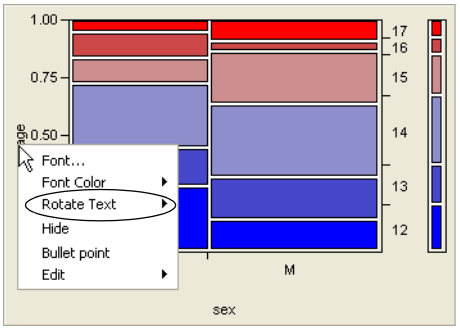
To change the font color:

1 Right-click an axis label.
2 Select **Font Color**.
3 Select a color for the text from the color palette provided.

Rotating Axis Labels

You can modify the axis label on any axis type. To rotate an axis label:

1 Right-click an axis label.
2 Select **Rotate Text**.
3 Select which direction to rotate the text: **Horizontal**, **Left**, or **Right**.



To set a default axis label position for a variable, which avoids making this change every time you run an analysis, see "Changing Columns' Default Axis Settings," p. 152.

Copying and Pasting Graph Contents

After customizing a graph by adding elements such as a fitted line, you can copy and paste the contents from one graph to another compatible graph:

1 Right-click the graph you have customized.
2 Select **Edit > Copy Frame Contents**.
3 Right-click the graph to which you would like to copy the settings.

4 Select **Edit > Paste Frame Contents.**

Copying and Pasting Axis Settings

After customizing an axis (as described in "Customizing Axes and Axis Labels," p. 200), you can copy and paste your new settings to another axis:

1 Right-click the axis you have customized.
2 Select **Edit > Copy Axis Settings.**
3 Right-click the axis to which you would like to copy the settings.
4 Select **Edit > Paste Axis Settings.**

Changing the Order of Values

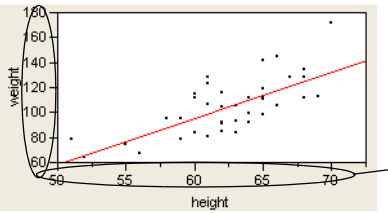
Data in a JMP report might not appear in the order you prefer. To give data a specific order so it appears that way in a report, assign the column the Value Ordering property before running the analysis, as described in "Ordering Values in Columns," p. 149.

If your values include any of the following, they will automatically appear in the appropriate order in reports:

- January, February, March, April, May, June, July, August, September, October, November, December
- Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
- Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
- Very Low, Low, Medium Low, Medium, Medium High, High, Very High
- Strongly Disagree, Disagree, Neutral, Indifferent, Agree, Strongly Agree
- Failing, Unacceptable, Very Poor, Poor, Bad, Acceptable, Average, Good, Better, Very Good, Excellent, Best

Customizing Tick Marks and Tick Mark Labels

On a numeric axis, you can add and remove tick marks, add and remove gridlines, and add minor tick marks. You can also change the font type, size, and style (bold or italic), the color of the text, rotate the axis labels, or add an outline box to nominal or ordinal axes' tick mark labels. The following sections describe how to customize them.



Adding Tick Marks and Gridlines

For plots and charts that contain a numeric axis area, you can show or hide tick marks and gridlines. To do this, double-click a numeric axis. Or, right-click a numeric axis and select **Axis Settings**. The Axis Specification window appears, as shown in Figure 6.36. Use the table below to show or hide tick marks and gridlines.

Figure 6.36 Show or Hide Tick Marks and Gridlines

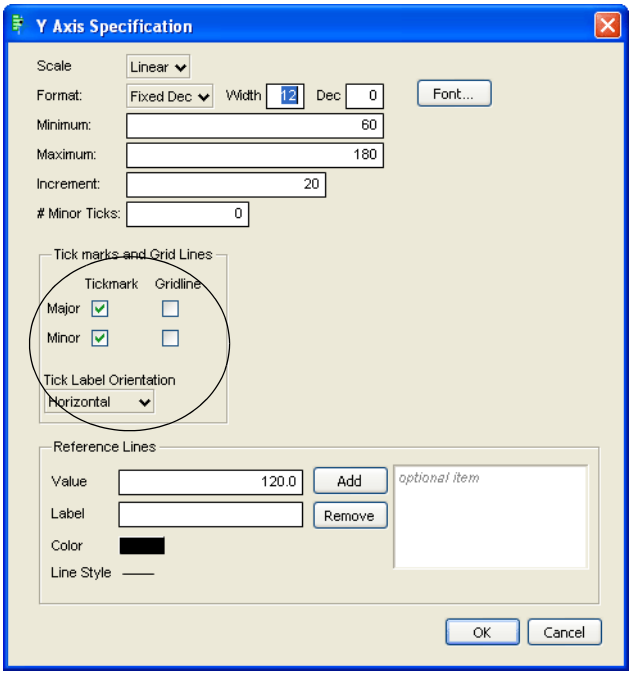


Table 6.1 Showing Tick Marks and Gridlines

Action	Instructions
Show major tick marks	Click the box to the right of **Major** and underneath **Tickmark**.
Show minor tick marks	Click the box to the right of **Minor** and underneath **Tickmark.**
Show gridlines for minor tick mark increments	Click the box to the right of **Minor** and underneath **Gridline**.
Show gridlines for major tick mark increments	Click the box to the right of **Major** and underneath **Gridline**.

Below the check boxes, the orientation of the Tick Labels can be set by a drop-down list. **Horizontal** and **Vertical** refer to single axes, while **Parallel** and **Perpendicular** refer to paired axes, like in Multivariate plots.

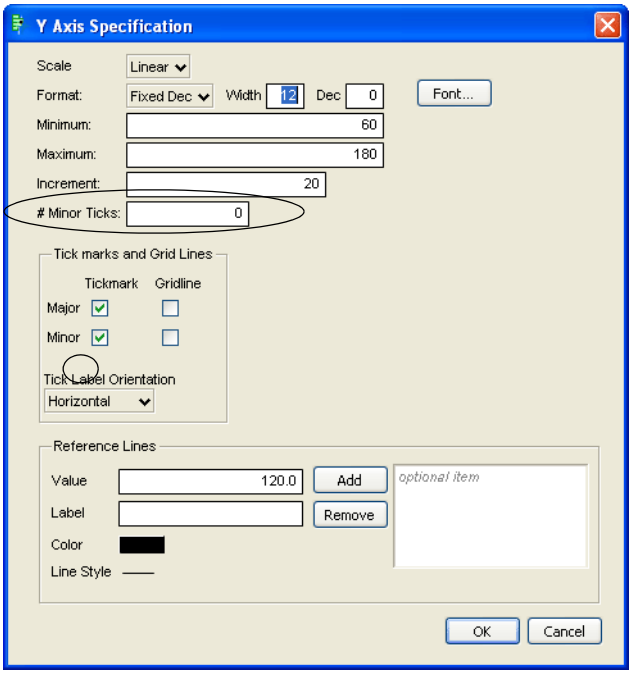
To set default tick marks for a variable, which avoids making this change every time you run an analysis, see "Changing Columns' Default Axis Settings," p. 152.

Adding Minor Tick Marks

To add tick marks to a numeric axis, or to change the number of minor tick marks that appear on a numeric axis:

1 Double-click the tick mark. Or right-click it and select **Axis Settings**. The Axis Specification window appears.
2 In the box beside **# Minor Ticks**, type the number of minor tick marks you want to appear between major tick marks. See Figure 6.37.
3 Click the box to the right of **Minor** and below **Tickmark** to indicate that you want the tick marks to appear on the axis. See Figure 6.37.

Figure 6.37 Changing the Number of Minor Tick Marks



To set default minor tick marks for a variable, which avoids making this change every time you run an analysis, see "Changing Columns' Default Axis Settings," p. 152.

Adjusting the Field Width of Labels

On plots and charts that contain a numeric axis area, you can adjust the width of the tick mark labels so that they show large values with many decimal places or only a small amount of space/truncated values. If the field width is set too small, your tick mark labels will appear as an ellipsis (three periods).

To change the field width while viewing a graph:

1 Double-click a numeric axis. Or, right-click and select **Axis Settings**. The Axis Specification window appears.
2 In the **Field Width** text box, type the number of characters needed to accommodate the largest number of digits or characters you think the new column could have. The maximum field width is

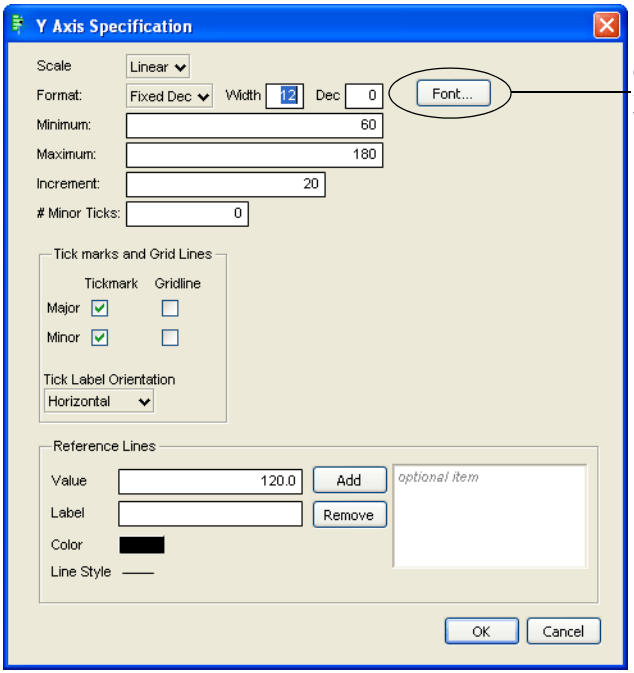
40 for numeric values. There is no limit for character values.

Note that in increasing/decreasing the field width of tick mark labels, you do not change the field width for the cells that contain the values in the corresponding data table. To change the field width of cells in a data table, see the section "Choosing Numeric Formats," p. 61.

Changing Tick Mark Label Font Types and Sizes

You can modify a numeric axis *tick label*'s font type, size, and style (bold and italic). To change font type and size:

1 Double-click the tick label. Or, right-click it and select **Axis Settings**. The Axis Specification window appears.
2 Select **Font**, and make your selections.



Click to change the tick label's font specifications

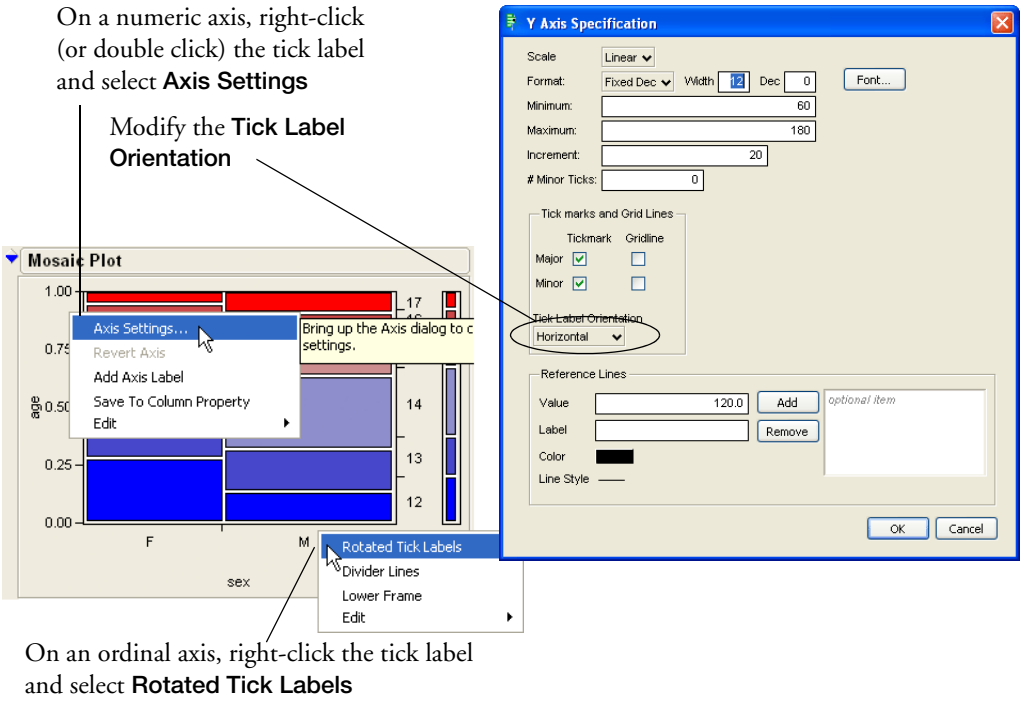
Note: To make global changes to all types of axes' font types and sizes, select **File > Preferences** (**JMP > Preferences** on the Macintosh). Click the **Fonts** tab, and then click **Axis**.

Rotating Tick Mark Labels

To rotate tick mark labels vertically or horizontally:

1 Double-click the tick label. Or, right-click it and select **Axis Settings**. The Axis Specification window appears. On a nominal axis, right-click the tick label and select **Rotated Tick Labels.**

Figure 6.38 Rotating Tick Labels on a Nominal or Ordinal Axis



2 Select **Rotated Tick Labels**, as shown in Figure 6.38

To rotate them back, complete the steps again.

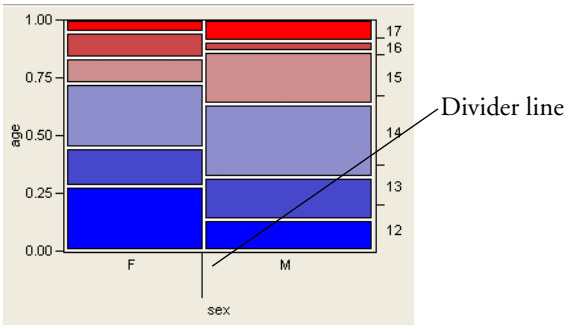
Extending Divider Lines and Frames

Extending the vertical divider line(s) between tick labels is useful when there are many levels of a nominal or ordinal variable.

To extend the divider line to the *x*-axis labels:

1 Right-click a nominal or ordinal axis.

2 Select **Divider Lines** to add the lines, or **Lower Frame** to add a frame around the axis area.



Adding Reference Lines

To add references lines to graphs:

1 Double-click a numeric axis. Or, right-click a numeric axis and select **Axis Settings**. The Axis Specification window appears.

2 In the text box to the left of the **Add Ref Line** button, type the value to which you want the reference line to correspond. This will be the position on the graph at which the line will be placed, as shown in Figure 6.39.

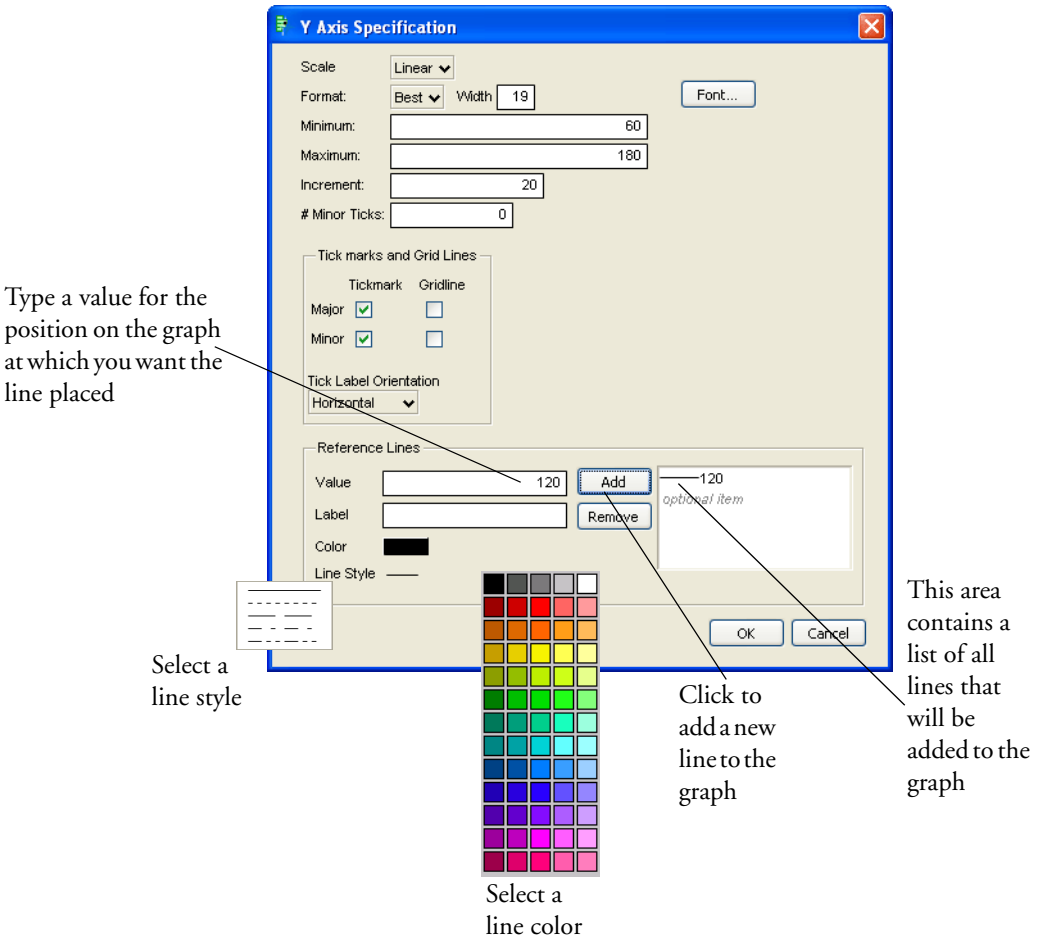
3 Further customize the reference line by choosing either of these options:

Action	Instructions
Give the line a color	Click the color bar drop-down menu and select a color, as shown in Figure 6.39.
Use a stippled line	Click the line drop-down menu and select one of the line types, as shown in Figure 6.39.

4 Click the **Add Ref Line** button. The value will move into the box to the right of the **Add Ref Line** button, indicating that it will be placed on the graph.

5 To add more lines, repeat the above steps.

Figure 6.39 Adding a Reference Line



To set a default reference line for a variable, which avoids making this change every time you run an analysis, see "Changing Columns' Default Axis Settings," p. 152.

Adding Elements to a Report

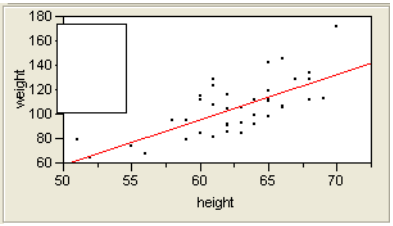
You can add text notes, lines, polygons, ovals, and rectangles to a report using graphics tools found in the toolbar.

Adding an Annotative Note

You can add editable text notes to a JMP report using the annotate tool ( ). To add an annotation:

1 Select the annotate tool ( ) from the **Tools** menu or toolbar.

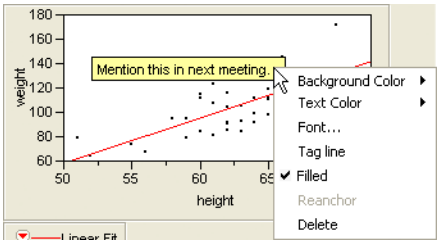
2 Click the location in the window where you want to add the annotation. Or, click-and-drag to size the annotation note. A white editable text box is displayed.



3 Enter text.

4 Click outside the annotation. The annotation turns yellow.

5 Right-click the annotation to access the following options:

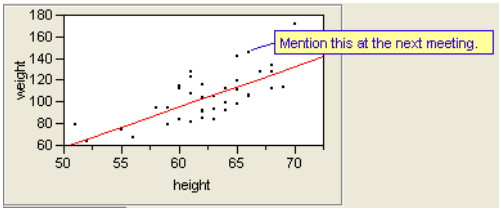


Background Color Provides you with a color palette, from which you can select the background color for the annotation.

Text Color Provides you with a color palette, from which you can select the color for the annotation's text. The color of the font also defines the color of the annotation outline. If you select the same color for both the background and the font, the font does not show except for black and white. A black font on a black background changes to white, and a white font on a white background appears black.

Font Lets you change the current font type, style, and size. To change the default font, see "Customizing Fonts," p. 344.

Tag line Attaches a line to the annotation that points to a place in the text, as shown below. To move the line with the annotation to a new position, press the Ctrl key (Command key on the Macintosh) and drag the annotation.



Filled Removes the background color from the annotation so it looks transparent. A transparent note is handy for putting titles and footnotes on a graph.

Reanchor Reanchors the annotation.

Delete Deletes the entire annotation.

Note: When adding multiple annotations, press the Shift key when selecting the annotation tool for the first time. This causes subsequent clicks to add an annotation, and you will not have to select the annotate tool from the toolbar before the addition of each annotation.

Once you've added an annotation, you can do the following:

Table 6.2 Using Annotations

Action	Instructions
Add to or edit an annotation	Click inside the text box.
Move an annotation	Click inside the annotation box and drag it. When an annotation is moved, it becomes selected, as indicated by a double blue line with handles around the perimeter.
Resize an annotation	Place the cursor on the handle of a selected note (showing in the middle of the edges and in the corners) and it appears as a single crossed arrow; drag to resize the annotation.
Delete an annotation	Highlight the annotation by clicking the handle of a note. Then press the Delete (or Backspace) key.

Adding Shapes

You can add editable lines, polygons, and simple shapes (ovals or rectangles) to a JMP report using the drawing tools ( ). The following sections describe how each of these tools can be used.

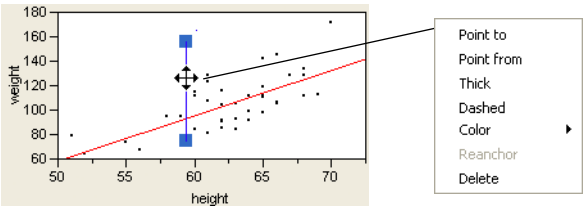
Note: Each graphics tool remembers the most recent options chosen. This is useful if you need many annotations or other graphics with the same characteristics. For example, suppose you want many thick green lines with an arrow on one end. Create a line the way you want it, set the options, and subsequent lines appear with those options in effect. The options persist until you change them.

Adding a Line

To add a line to a report window:

1 Click the line tool ( ) in the tool palette.
2 Click and drag where you want to insert the line. The line appears selected, showing handles on both ends, such as is shown in Figure 6.40.
3 Click and drag the line to move it.
4 Click a handle and drag to rotate the line.
5 Right-click (Ctrl-click on the Macintosh) a line for a menu of options to tailor the appearance of the line, as shown in Figure 6.40.

Figure 6.40 Right-Click a Line to Tailor Its Appearance.



Point to and Point from Places arrows on either end (or both ends) of the line.

Thick Alternately displays the width of a line as thick or thin. A line is thin by default.

Dashed Alternately displays a line as dashed or solid. A line is solid by default.

Color Displays the JMP color palette to change the color of the shape.

Reanchor Reanchors the shape.

Delete Removes the shape from the report surface. You can also remove the shape by selecting it and then pressing the Delete (or Backspace) key.

Adding a Polygon or Spline

To add a polygon (also known as a spline) to a report window:

1 Click the polygon tool ( ) in the tool palette.
2 Click to create the beginning point for the first side of a polygon.
3 Click again at the location where you want to complete the first side and begin an adjacent side. A square selection box with handles appears around the polygon area.
4 Click a third time to complete the second side.
5 Continue this process until the polygon is the way you want it. Each time a side is complete, the selection box adjusts to encompass the polygon sides.
6 Double-click to release the polygon tool.

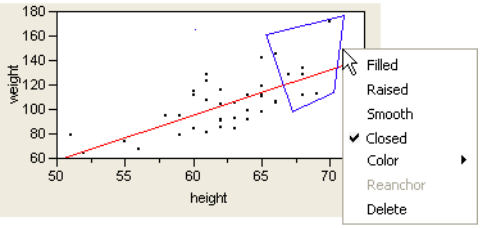
Once you've added a polygon, you can do the following:

Table 6.3 Working with Polygons

Action	Instructions
Select or deselect the polygon	Click the edge of a completed polygon.
Resize the polygon	Select it and drag one of the selection box's handles.
Move the polygon	Click between the box's handles and drag the selection box.
Change the number of sides of the polygon	Click and drag the sides to form the new shape.

Select the polygon, and then right-click (Ctrl-click on the Macintosh) it for a menu of options to tailor its appearance, as shown in Figure 6.41.

Figure 6.41 Right-Click a Polygon to Tailor Its Appearance.



Filled Alternately fills or empties the area of the shape.

Raised Displays thick shaded lines around the shape. If the shape is also filled, the lower edge of the figure appears raised, giving it a three-dimensional look.

Smooth Smooths the vertices of a polygon to produce a Bezier curve. The smoothed figure is reshaped and resized the same way as the polygon, and can be filled and raised.

Closed Alternately opens or closes the last segment of a polygon.

Color Displays the JMP color palette to change the color of the shape's sides, and its fill color when the Filled option is in effect.

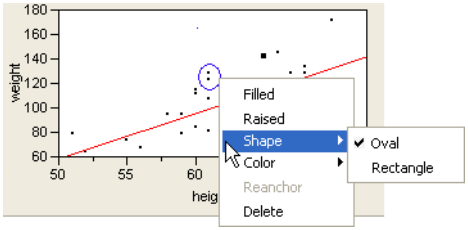
Reanchor Reanchors the shape.

Delete Removes the shape from the report. You can also remove the shape by selecting it and then pressing the Delete (or Backspace) key.

Adding an Oval or Rectangle

To add an oval or rectangle to a report window:

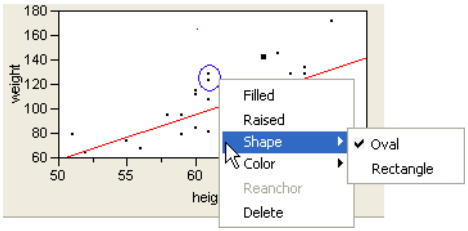
1 Click the simple shape tool (◯) in the tool palette.
2 Click and drag where you want to insert the shape. An oval appears with a selection box around it.
3 (optional) Right-click (Ctrl-click on the Macintosh) the edge of the oval and select **Shape** to turn the oval into a rectangle.



Once you've added the shape, you can do the following:

- Select the shape and drag one of the selection box handles to reshape or resize.
- Click and drag an edge of the selection box (located between the handles) to move it.
- Select the shape, and then right-click (Ctrl-click on the Macintosh) it for a menu of options to tailor its appearance, as shown in Figure 6.42.

Figure 6.42 Right-Click an Oval or Rectangle to Tailor Its Appearance.



Filled Alternately fills or empties the area of the shape.

Raised Displays thick shaded lines around the shape. If the shape is also filled, the lower edge of the figure appears raised, giving it a three-dimensional look.

Shape Displays a submenu whose options transform the shape into either an oval or a rectangle when selected.

Color Displays the JMP color palette to change the color of the shape's sides and its fill color when the **Filled** option is in effect.

Reanchor Reanchors the shape

Delete Removes the shape from the report. You can also remove the shape by selecting it and then pressing the Delete (or Backspace) key.

Adding Graphics (Windows and Macintosh Only)

To enhance your graphs with logos, pictures, or any other type of graphic, you can paste it into a report in .bmp, .jpeg, or .png format. You can also drag and drop graphics into reports.

To add graphics:

1 Open the graphic file and select the graphic. Copy it to the computer's clipboard.
2 Right-click inside a graph.
3 Select **Paste**. The graphic is inserted at the point in the graph that you right-clicked.

You can also add the graphic to the end of a report window by copying the graphic into computer memory, making sure the report is the active window and selecting **Edit > Paste**.

Adding and Editing Graphics Scripts

Once you have a report, you can add a script that inserts graphical elements to the report.

To add a graphics script to a report, right-click the graph and select **Customize**.

Options

The options in the customize menu follow. (See Figure 6.45.)

Line Color changes the color of the line. Click to choose from any color in the window. Right-click for a selection of 65 colors in the color menu. See "Changing Color Schemes and Languages," p. 342.

Line Style changes the style of the line. Click to choose from a selection of five different styles. (See Figure 6.43.)

Line Width changes the width of the line. Click in the box and type the desired line width.

Marker changes the marker shape or size. Left-click to change the shape. Right-click to change the size. For more information about markers, refer to "Using Markers," p. 187.

Line of Fit Marker changes the markers specific to the line points. These markers relate only to the Line of Fit properties. Left-click to change the shape. Right-click to change the size.

Text Color changes the color of the text.

Font changes the font, style, and size of the text. (See Figure 6.44.)

Text Style changes the style of the text. Center, left, or right justify the text. The last option is fill, which fills in the background of the text with the color specified.

Fill Color changes the color of the Fit Confidence Region.

Transparency changes the marker or label opacity. Type the level of transparency you want the markers (points) to have on the graph. The degrees of opacity ranges from 1 (opaque) to 0 (clear). See "Changing the Marker Drawing Mode and Transparency," p. 189.

To apply transparency to an entire graph, see "Specifying Marker Transparency," p. 190.

Figure 6.43 Line Style

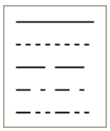


Figure 6.44 Font Menu

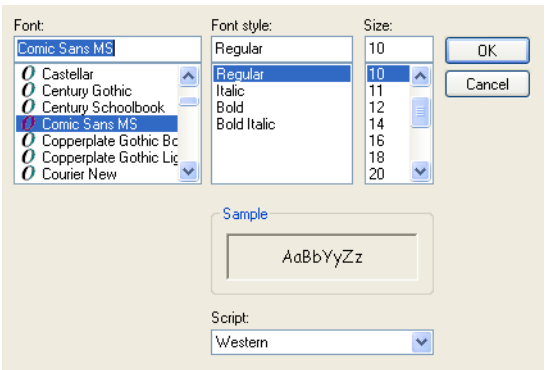
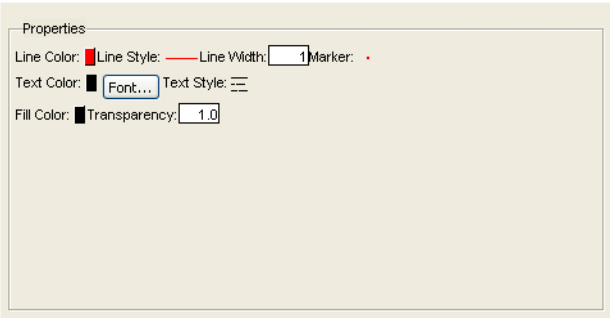


Figure 6.45 shows all the options available for customization.

Figure 6.45 Custom Sample

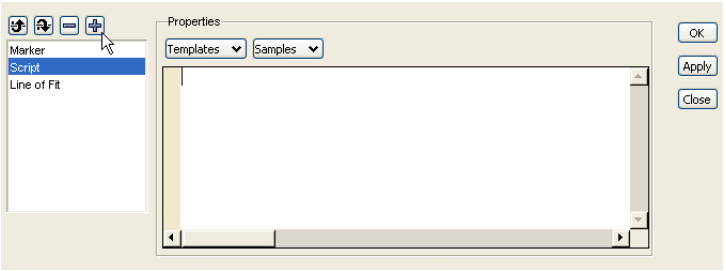


Applying a Script to a Graph

To apply a script to the graph, follow these steps. In this example, a sine wave is applied to the graph.

1 Click the plus (+) button. (See Figure 6.46.) This opens up the script window.

Figure 6.46 Script Window



2 In the Customize Graph window, double-click **Script** and type "My Sine Wave."

3 Click the Samples drop-down menu and select **Sine Wave**.

4 Click **OK** or **Apply**.

The sine wave is now overlaid on top of the graph.

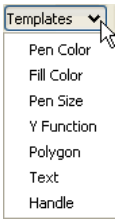
Customize Graph Menus

You have several menu options when you apply scripts to graphs.

Using templates

Click the Templates drop-down menu for a list of templates. (See Figure 6.47.)

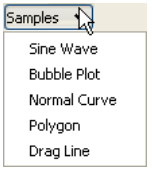
Figure 6.47 Templates



Using samples

Click the Samples drop-down menu for a list of samples.

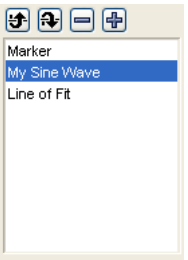
Figure 6.48 Samples



Deleting a script

1 Click the script that you want to delete in the left panel. The script that you click on is highlighted, as shown in Figure 6.49.

Figure 6.49 Scripts



2 Click the minus (–) button.

Note: Only custom scripts can be deleted or moved (such as My Sine Wave). You cannot delete or move any built-in scripts (such as Line of Fit).

Moving items drawn in a graph over or underneath another script

To draw a script on top of or underneath another script, move the script in the drawing order. The drawing order is the order in the list. (See Figure 6.49.)

1 Click the script that you want to move in the left panel. The script that you click on is highlighted.
2 Click one of the arrows to move the script.

The arrows are used to move the selected script in the list. The order of the list corresponds to the layers in the graph. Scripts are drawn top to bottom, so the last script in the list is drawn on top of all the ones before it.

Script Submenu

The customization menu applies to all script submenus in JMP. See "Saving Your Steps as a Script," p. 179.

Copying

To copy line graph content from one graph to another, see "Copying and Pasting Graph Contents," p. 204.

Copying Customizations

To copy a sine wave, follow these steps.

1 Right-click in the graph that you want to customize and select **Customize**.
2 Click the plus (+) button.

This opens up the script window.

3 In the Customize Graph window, double-click **Script** and type "My Sine Wave."
4 Click the Samples drop-down menu and select **Sine Wave**.
5 Click **OK**.

The sine wave is now overlaid on top of the customized graph.

6 Right-click in the customized graph and select **Edit > Copy Customizations**.
7 Right-click in the graph to which you would like to copy the settings and select **Edit > Paste Customizations**.

The customized sine wave is now copied onto the graph.

Note: The copy customizations feature only copies what you added (such as My Sine Wave). It does not copy all contents in the graph.

Chapter 7

Reshaping Data

Subset, Concatenate, Join, and More

You can perform a wide variety of data management tasks on JMP data:

- Create a new data table from a subset of rows and columns from another data table
- Sort by any number of columns
- Stack multiple columns into a single column
- Split a column into two columns
- Transpose rows and columns
- Concatenate multiple tables end to end
- Join two tables side by side
- Update columns in a table with values from another table

Contents

Creating a Subset Data Table 223
Sorting Data Tables 225
Stacking Columns 227
Example of Stacking into One Column 229
Example of Stacking Into More Than One Column (Using the Multiple Series Stack Option) . . 230
Example of Contiguous Stacking 231
Splitting Columns 232
Transposing Rows and Columns 237
Concatenating Data Tables 241
Joining Data Tables 244
How to Join Data Tables 244
Examples of Joining Data Tables 246
Updating a Data Table 256

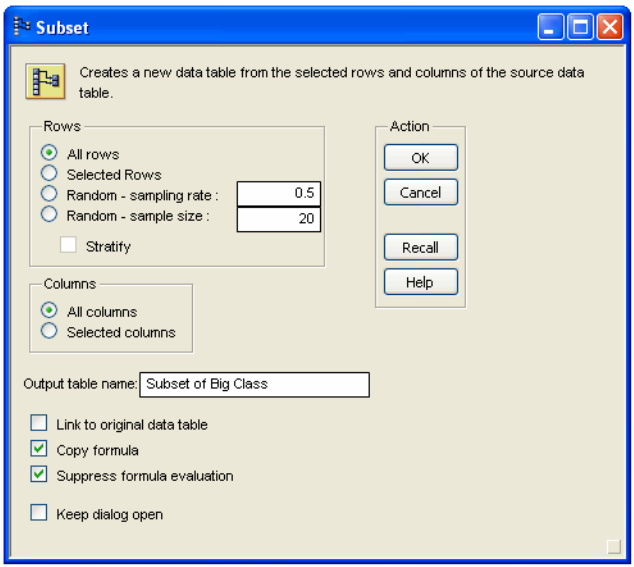
Creating a Subset Data Table

You can produce a new data table that is a subset of all rows and columns, only highlighted rows and columns, or randomly selected rows from the active data table.

To create a subset:

1 Select **Tables > Subset**. The window in Figure 7.1 appears.

Figure 7.1 The Subset Window



2 Select a row option from the list:

- **All Rows** Creates a subset table that contains all rows from the active table.
- **Selected Rows** Creates a subset table that contains only the selected rows from the active table.
- **Random - sampling rate** Creates a subset table whose data is a random proportion of the active data table. Enter the proportion of the sample you want in the text box. For example, if you want a random 50% of the data to be included in the new table, enter 0.5 in the text box.
- **Random - sample size** Creates a subset table whose data is a random sample of the active data table. Enter the size of the sample you want in the text box. For example, if you want 16 random rows to be included in the new table, enter 16 into the text box.

Note: If you select a random sample that is the entire source table, the result is a random shuffle of the rows of the data table. If Stratify columns are specified, the result is a random shuffle of each of the rows for each group.

---

3 Select a column option from the list:

- **All columns** Creates a subset table that contains all columns from the active table.

– **Selected columns** Creates a subset table that contains only the columns from the active table.

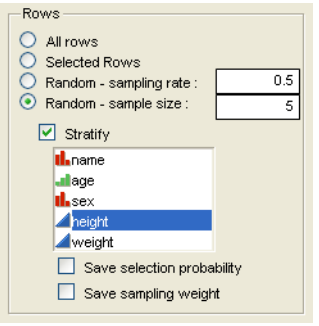
4 Use the following table to further customize your subset table:

Action	Instructions
Output table name	To give a name to the subset table, type a name in the box beside **Output table name**.
Link to original data table	To keep the subset table and any plot or graph of that subset table linked to the original table, click the box beside **Link to original data table**.
Copy formula	To include formulas from the original table in the output columns, click the box beside **Copy formula**. Include all columns needed for the calculation of the formula. This option is not present when there are no formulas in the data table.
Suppress formula evaluation	To prevent JMP from evaluating columns' formulas when the new table is created, click the box beside **Suppress formula evaluation**. This option is not present when there are no formulas in the data table.
Keep dialog open	To keep this window open after clicking **OK**, check the box beside **Keep Dialog Open**.

Tip: To quickly create a subset table, highlight the rows you would like to subset, press the Shift key and select **Tables > Subset**. JMP creates a linked subset table without asking you to complete the Subset window.

Stratified Subsets

If you specify a sample size and add stratification columns, the sample size represents the size per stratum, rather than the size of the whole subset.



There are also two columns that can be saved for stratified random subsets, **Selection Probability** and **Sampling Weight.** Check the corresponding check box to save these columns.

Creating a Subset Data Table from a Report

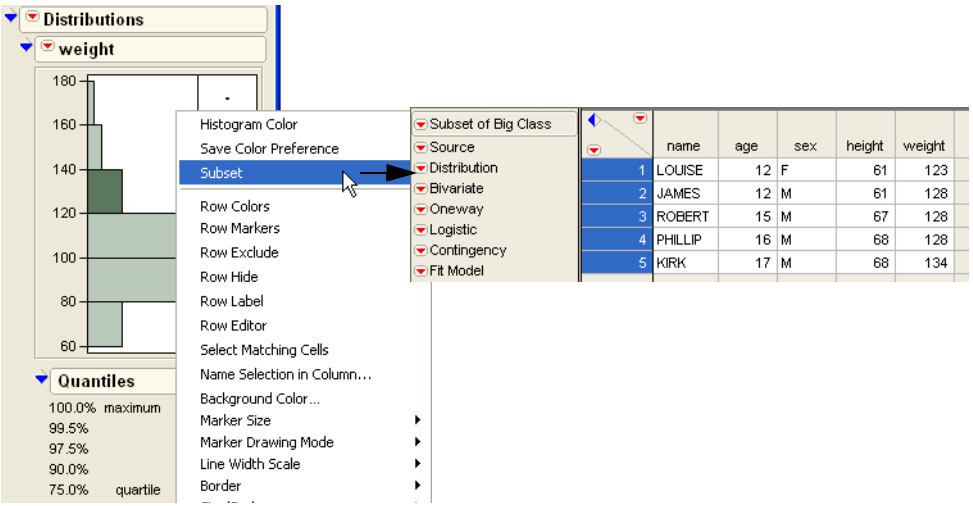
These two methods produce linked subsets of a data table.

Using a Histogram

After you produce output that contains a histogram (by selecting **Analyze > Distribution**), you can use the histogram to create a new data table containing the data in the histogram's highlighted bars.

To create a subset, double-click a highlighted bar. Or, right-click (Ctrl-click on the Macintosh) anywhere in the histogram and select **Subset** from the menu. The subset table appears, as shown in Figure 7.2.

Figure 7.2 Subset Created from a Histogram



Using a Pareto Plot

After you produce output that contains a Pareto Plot (by selecting **Graph > Pareto Plot**), you can use the Pareto Plot to create a new data table containing the data in the Pareto Plot's highlighted bars. To create a subset, double-click a highlighted bar.

Sorting Data Tables

You can sort a JMP data table by columns in either ascending or descending order. By default, columns sort in ascending order. You can either create a new table that contains the sorted values, or you can replace the original table with the sorted table.

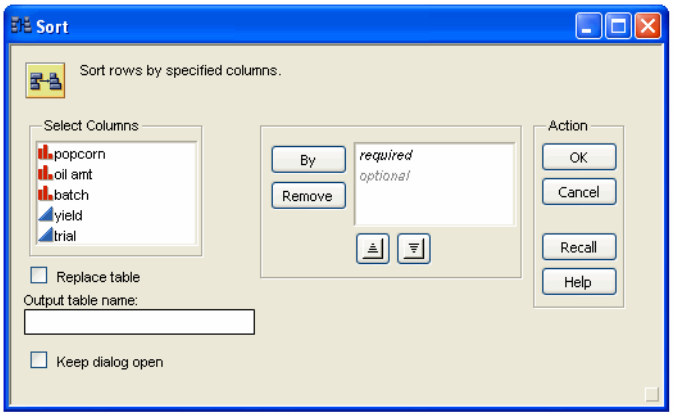
If columns contain value labels, sorting is based on the actual data values, not the value labels. (See "Using Value Labels," p. 147.) However, the value labels are displayed in the sorted data table.

A column that your sorting that uses either the Value Ordering property or the List Check property is sorted according to that order.

To sort:

1 Select **Tables > Sort**. The window in Figure 7.3 appears.

Figure 7.3 The Sort Window



2 Highlight the names of the columns by which you would like to sort.

3 Click the **By** button to add them to the sort list. The columns you add to the list establish the order of precedence for sorting. The first column in the list is the major sort field. Each variable thereafter is sorted within the previous variable in the sort list.

4 Use the following table to further customize the sort:

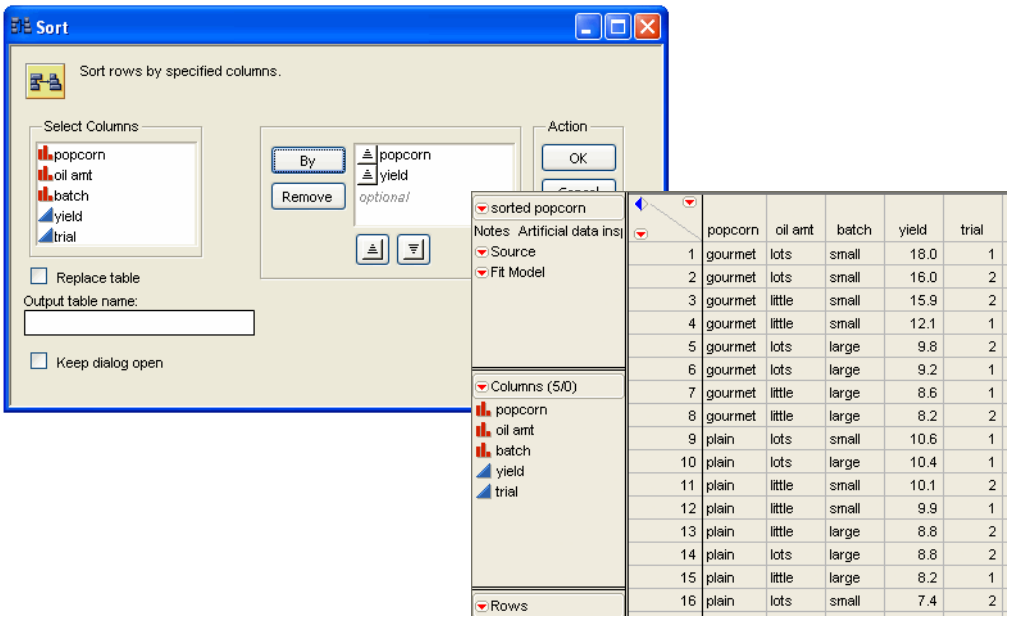
Option in JMP	Description
ascending/descending buttons ( )	To change the order that the values of the grouping variables will be listed (ascending or descending order), select a variable in the By variable list and click the appropriate ascending/descending buttons ( ). The icon beside the variable changes to indicate the sorting order.
Replace Table	To replace the original data table with the sorted table instead of creating a new table with the sorted values, click the box beside **Replace Table**. This option is not available if there are any open report windows generated from the original table.
Output table name	To give a name to the sorted table, type a name in the box beside **Output table name**.
Keep dialog open	To keep this window open after clicking **OK**, check the box beside **Keep Dialog Open**.

5 Type a name for the new sorted table in the box beside **Output Table**.

6 Click **Sort**.

Follow along with this next example by opening Popcorn.jmp from the Sample Data folder that was installed when you installed JMP. Figure 7.4 shows Popcorn.jmp in its original form (top table) and sorted by popcorn and yield (within popcorn) (bottom table).

Figure 7.4 Sort in Ascending or Descending Order



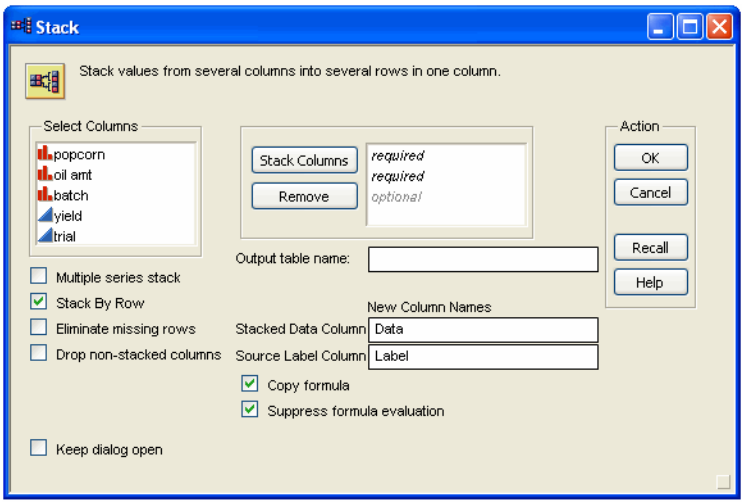
Stacking Columns

You can rearrange your data table by stacking two or more columns into a single new column, preserving the values from the other columns. Or, you can stack a set of columns into multiple groups. The various ways you can stack columns are explained in the table in step 3 below.

To stack columns:

1 Select **Tables > Stack**. The window shown in Figure 7.5 appears.

Figure 7.5 Stack Window



2 Highlight the names of the columns you want to stack and click **Stack Columns**.

3 Use the following table to further customize the stacking.

Option in JMP	Description
Multiple series stack	To stack selected columns into two or more columns, check the box beside **Multiple series stack**. Specify the number of columns into which you want the selected columns to be stacked by entering the number into the **Number of Series** box. This box appears when you check the box beside **Multiple series stack**. For details, see "Example of Stacking Into More Than One Column (Using the Multiple Series Stack Option)," p. 230. **Note:** The order in which you add columns to the box on the right determines the group to which they belong.
Stack by Row	Leaving **Stack by Row** unchecked stacks one column underneath another. Checking it stacks columns by rows.
Eliminate missing rows	To eliminate missing data from the new table, check the box beside **Eliminate missing rows**. If **Stack by Rows** is checked also, only rows with all data missing are eliminated.
Drop non-stacked columns	To have only the stacked columns appear in the new table, check the box beside **Drop non-stacked columns.** When not checked, the new table contains all columns from the original table plus the newly stacked columns.
Output table name	To name the new table, type a name in the box beside **Output table name**.

Option in JMP	Description
Stacked Data Column	To assign a name to the column that will contain the "stacked" columns' data, enter a name in the **Stacked Data Column** box. Leave the box empty if you do not want this column to appear in the new table.
Source Label Column	To assign a name to the column that will contain the original table's column names, enter the name in the **Source Label Column** box. The default name is Label. Leave the box empty if you do not want this column to appear in the new table.
Copy formula	To include formulas from the original table in the output columns, click the box beside **Copy formula**. This option is not present when there are no formulas in the data table.
Suppress formula evaluation	To prevent JMP from evaluating columns' formulas when the new table is created, check the box beside **Suppress formula evaluation**. This option is not present when there are no formulas in the data table.
Keep dialog open	To keep this window open after clicking **OK**, check the box beside **Keep Dialog Open**.

Example of Stacking into One Column

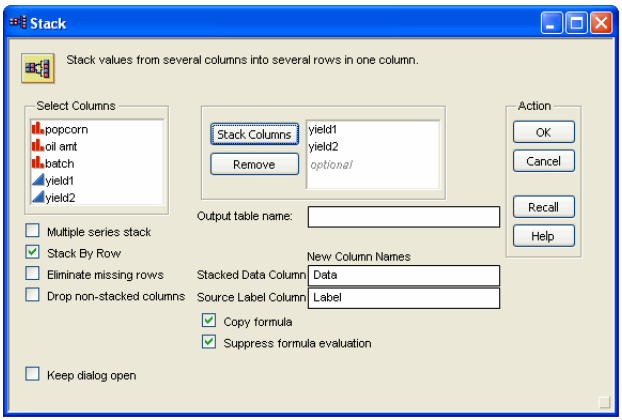
The data table on the left in Figure 7.6 shows the sample JMP data table called popcorn trials.jmp, with two columns listing popcorn yield from two popping trials conducted under various conditions. A researcher wants the data table to display only one column containing the yields from the trials. He would want the two columns called yield1 and yield2 to be stacked into a single column (by default, this new single column would be called Data).

By selecting **Tables > Stack** and completing the window shown in the middle in Figure 7.6, the researcher would create the new table found on the bottom in Figure 7.6. The column named Label is the **Source Label Column** that identifies the source of the data. Its values are the column names in the original table from which the stacked values originated.

Figure 7.6 Stack Window and Stacked Columns Example

Original table

	popcorn	oil amt	batch	yield1	yield2
1	plain	little	large	8.2	8.8
2	gourmet	little	large	8.6	8.2
3	plain	lots	large	10.4	8.8
4	gourmet	lots	large	9.2	9.8
5	plain	little	small	9.9	10.1
6	gourmet	little	small	12.1	15.9
7	plain	lots	small	10.6	7.4
8	gourmet	lots	small	18.0	16.0



New table

	popcorn	oil amt	batch	Label	Data
1	plain	little	large	yield1	8.2
2	plain	little	large	yield2	8.8
3	gourmet	little	large	yield1	8.6
4	gourmet	little	large	yield2	8.2
5	plain	lots	large	yield1	10.4
6	plain	lots	large	yield2	8.8
7	gourmet	lots	large	yield1	9.2
8	gourmet	lots	large	yield2	9.8
9	plain	little	small	yield1	9.9
10	plain	little	small	yield2	10.1
11	gourmet	little	small	yield1	12.1
12	gourmet	little	small	yield2	15.9
13	plain	lots	small	yield1	10.6
14	plain	lots	small	yield2	7.4
15	gourmet	lots	small	yield1	18.0
16	gourmet	lots	small	yield2	16.0

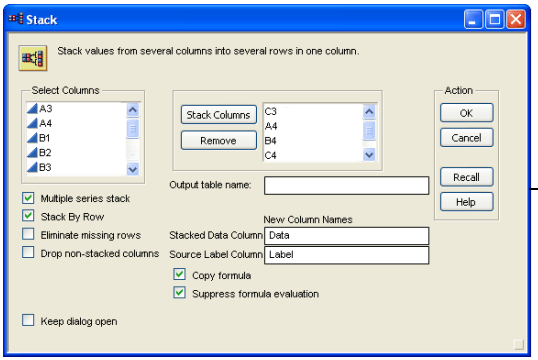
Example of Stacking Into More Than One Column (Using the Multiple Series Stack Option)

Suppose a researcher has the data table found at the top of Figure 7.7. If the researcher's goal is to have A1, A2, A3, and A4 in one column, B1, B2, B3, and B4 in a second column, and C1, C2, C3, and C4 in a third column, the researcher selects **Tables > Stack** then uses the **Multiple series stack** option in the Stack window. The researcher specifies 3 as the number of series because the researcher wants the output table to contain three stacked columns. The researcher also adds columns in an order that reflects the way the researcher wants the columns in the series grouped.

Figure 7.7 Multiple Series Stack Example

Original table

	Part	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
1	1	1	1	1	0	1	1	1	0	1	1	1	0
2	2	2	1	1	0	1	1	1	0	1	1	1	0
3	3	3	0	0	1	0	0	0	1	0	0	0	1
4	4	0	0	0	1	0	0	0	1	0	0	0	1
5	5	0	0	0	1	0	0	0	1	0	0	0	1
6	6	1	1	0	0	1	1	0	0	1	0	0	0
7	7	1	1	1	0	1	1	1	0	1	0	1	0
8	8	1	1	1	0	1	1	1	0	1	0	1	1
9	9	0	0	0	1	0	0	0	1	0	1	0	1
10	10	1	1	1	0	1	1	1	0	1	1	1	0



New table

	Part	Label	Data	Label 2	Data 2	Label 3	Data 3
1	1	A1	1	B1	1	C1	1
2	1	A2	1	B2	1	C2	1
3	1	A3	1	B3	1	C3	1
4	1	A4	0	B4	0	C4	0
5	2	A1	2	B1	1	C1	1
6	2	A2	1	B2	1	C2	1
7	2	A3	1	B3	1	C3	1
8	2	A4	0	B4	0	C4	0
9	3	A1	3	B1	0	C1	0
10	3	A2	0	B2	0	C2	0
11	3	A3	0	B3	0	C3	0
12	3	A4	1	B4	1	C4	1
13	4	A1	0	B1	0	C1	0
14	4	A2	0	B2	0	C2	0
15	4	A3	0	B3	0	C3	0

Example of Contiguous Stacking

A contiguous series stack lets you specify that the columns for **Multiple Series Stack** are contiguous. For example, suppose a data table contains columns a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, and c1, c2, c3, c4, c5, all to be stacked, where the series is 5 columns, as shown here.

Contiguous not checked

Label	Data	Label 2	Data 2	Label 3	Data 3	Label 4	Data 4	Label 5	Data 5
A1	1	A2	0	A3	1	A4	1	A5	0
B1	1	B2	1	B3	0	B4	1	B5	0
C1	1	C2	0	C3	0	C4	1	C5	1
A1	0	A2	1	A3	0	A4	1	A5	0
B1	0	B2	1	B3	0	B4	1	B5	0
C1	1	C2	0	C3	1	C4	0	C5	0
A1	1	A2	1	A3	1	A4	0	A5	1
B1	1	B2	1	B3	1	B4	0	B5	1
C1	0	C2	0	C3	0	C4	0	C5	1
A1	0	A2	0	A3	1	A4	0	A5	1
B1	1	B2	1	B3	0	B4	1	B5	0
C1	0	C2	0	C3	0	C4	1	C5	0

Contiguous checked

Label	Data	Label 2	Data 2	Label 3	Data 3	Label 4	Data 4	Label 5	Data 5
A1	1	A4	1	B2	1	B5	0	C3	0
A2	0	A5	0	B3	0	C1	1	C4	1
A3	1	B1	1	B4	1	C2	0	C5	1
A1	0	A4	1	B2	1	B5	0	C3	1
A2	1	A5	0	B3	0	C1	1	C4	0
A3	0	B1	0	B4	1	C2	0	C5	0
A1	1	A4	0	B2	1	B5	1	C3	0
A2	1	A5	1	B3	1	C1	0	C4	0
A3	1	B1	1	B4	0	C2	0	C5	1
A1	0	A4	0	B2	1	B5	0	C3	0
A2	0	A5	1	B3	0	C1	0	C4	1
A3	1	B1	1	B4	1	C2	0	C5	0

When **Contiguous** is not checked in the Multiple Series Stack, the results on the left are produced. When **Contiguous** is checked, the results on the right are produces.

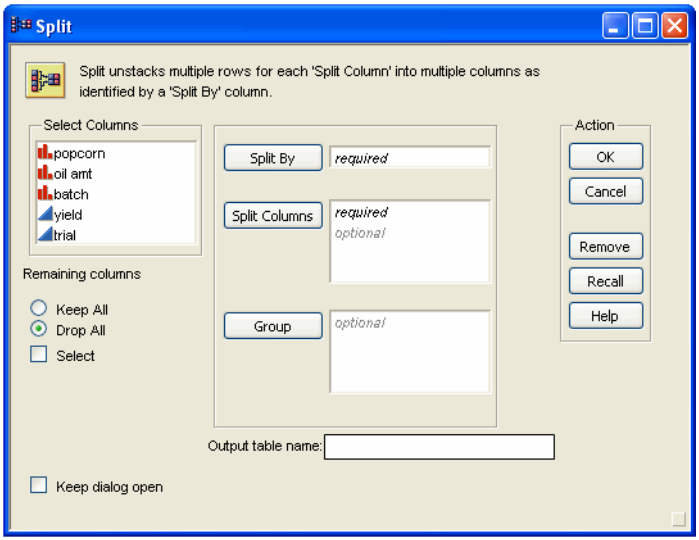
Splitting Columns

You can create a new data table from the active table by splitting one column into several new columns. This column is split according to the values found in another column, referred to as the **Split By** column. You can also split columns according to the values of one or more grouping variables.

To split columns:

1 Select **Tables > Split**. The window in Figure 7.8 appears.

Figure 7.8 Split Window



2 Highlight the names of the column or columns you want to split and click **Split Columns**.

3 Highlight a column whose values you want to use as the new column names and click **Split By**. The column name appears in the **Split By** box.

4 Use the following table to further customize the split.

Option in JMP	Description
Group	To use a grouping variable, highlight one or more columns whose values can uniquely identify each row in the new table and click **Group**. These will be your grouping variables. Each group results in a row in the output table
Output table name	To assign a name to the new table, enter the name in the box beside **Output table name**.

Option in JMP	Description
Copy formula	To include formulas from the original table in the output columns, click the box beside **Copy formula**. This option is not present when there are no formulas in the data table.
Suppress formula evaluation	To prevent JMP from evaluating columns' formulas when the new table is created, click the box beside **Suppress formula evaluation**. This option is not present when there are no formulas in the data table.
Keep All	To include all columns in the new table, click the **Keep All** option in the **Remaining Columns** area.
Drop All	To include only columns used in the split in the new table, click the **Drop All** option in the **Remaining Columns** area.
Select	To select which columns to keep in the new table, click the **Select** option in the **Remaining Columns** area. Then select which columns to keep in the new table.
Keep dialog open	To keep this window open after clicking **OK**, check the box beside **Keep Dialog Open**.

5 Click **Split**.

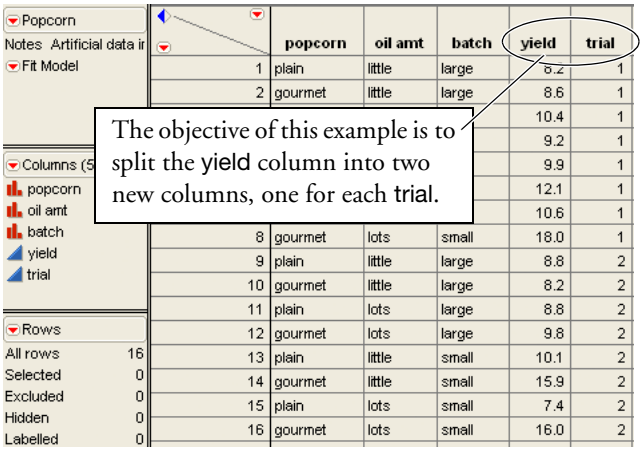
Examples of Splitting Columns

This section contains two examples using **Tables > Split**. In the first example ("Splitting a Column: Basic Example," p. 233), one column is split by a second column. The second example ("Splitting a Column: Grouping Rows Example," p. 236) is the same except that it also shows how to group the values in a column to reduce the number of rows produced in the new table.

Splitting a Column: Basic Example

In the Popcorn.jmp data table shown in Figure 7.9, the trial column shows that there were two trials, 1 and 2.

Figure 7.9 Original Data Table before Splitting yield Column

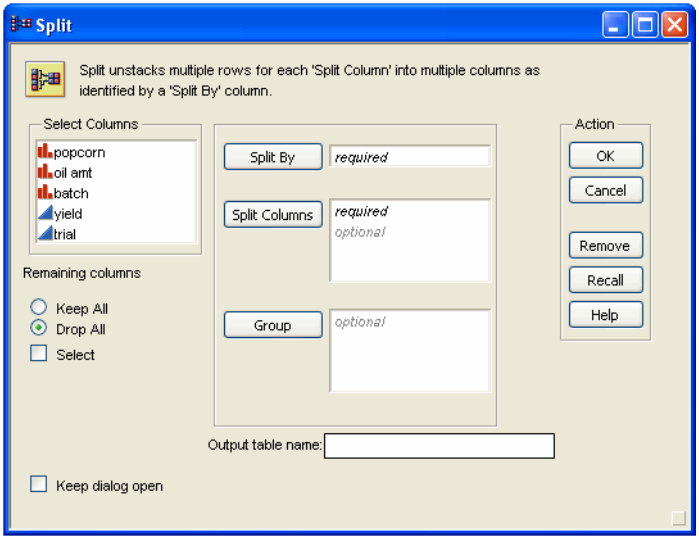


	popcorn	oil amt	batch	yield	trial
1	plain	little	large	8.2	1
2	gourmet	little	large	8.6	1
				10.4	1
				9.2	1
				9.9	1
				12.1	1
				10.6	1
8	gourmet	lots	small	18.0	1
9	plain	little	large	8.8	2
10	gourmet	little	large	8.2	2
11	plain	lots	large	8.8	2
12	gourmet	lots	large	9.8	2
13	plain	little	small	10.1	2
14	gourmet	little	small	15.9	2
15	plain	lots	small	7.4	2
16	gourmet	lots	small	16.0	2

For this example, you want to split the yield column into two new columns—one for trial 1 and one for trial 2—as follows:

1 Select **Tables > Split**. The Split window is displayed.

Figure 7.10 Split Window Defaults

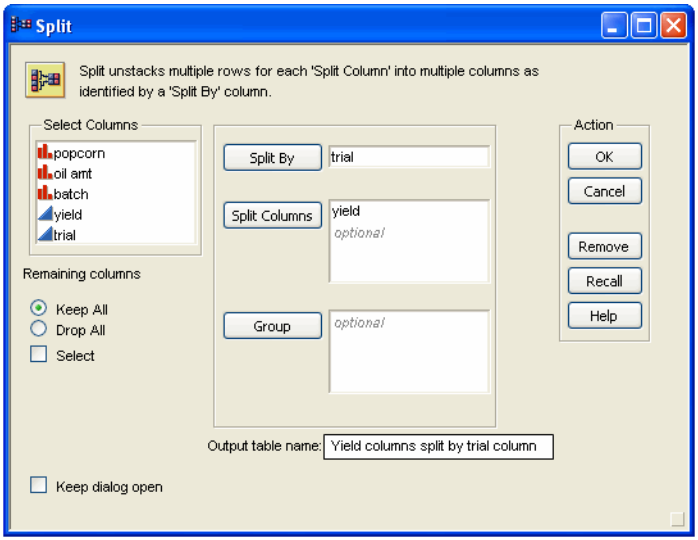


2 Drag the yield column to the **Split Columns** field, and then drag the trial column to the **Split By** field. (You have now completed the required fields.)

3 The default is to omit any columns that are not in the **Split By**, **Split Columns**, or **Group** fields, so select the **Keep All** choice to include these columns in the new table.

4 (Optional) Type Yield column split by Trial column in the Output table name field. See Figure 7.11.

Figure 7.11 Settings for Splitting yield Column By trial Column



5 Click **OK**.

A new data table is created that looks like Figure 7.12. Notice that the yield and trial columns are gone, and the data table has two new columns. The names of the new columns are the unique values (1 and 2) from the original trial column. The values from the original yield column are now split into the new columns named 1 and 2. Also, notice that the columns other than trial and yield are exactly the same as they were in the original table.

Figure 7.12 New Table Created by Splitting yield Column by trial Column

Yield column split by Trial column

Yield column split b
Source
Columns (5/0)
popcorn
oil amt
batch
1
2

	popcorn	oil amt	batch	1	2
1	plain	little	large	8.2	8.8
2	gourmet	little	large	8.6	8.2
3	plain	lots	large	10.4	8.8
4	gourmet	lots	large	9.2	9.8
5	plain	little	small	9.9	10.1
6	gourmet	little	small	12.1	15.9
7	plain	lots	small	10.6	7.4
8	gourmet	lots	small	18.0	16.0

The names of these new columns are values from the trial column, and the values in the new columns are from the yield column.

You can rename the new columns so the names are meaningful. For example, you might rename column 1 to yield (trial 1) and column 2 to yield (trial 2), as shown in Figure 7.13.

Figure 7.13 Rename the New Columns for Clarity

	popcorn	oil amt	batch	yield (trial 1)	yield (trial 2)
1	plain	little	large	8.2	8.8
2	gourmet	little	large	8.6	8.2
3	plain	lots	large	10.4	8.8
4	gourmet	lots	large	9.2	9.8
5	plain	little	small	9.9	10.1
6	gourmet	little	small	12.1	15.9
7	plain	lots	small	10.6	7.4
8	gourmet	lots	small	18.0	16.0

Rename the columns, if you choose.

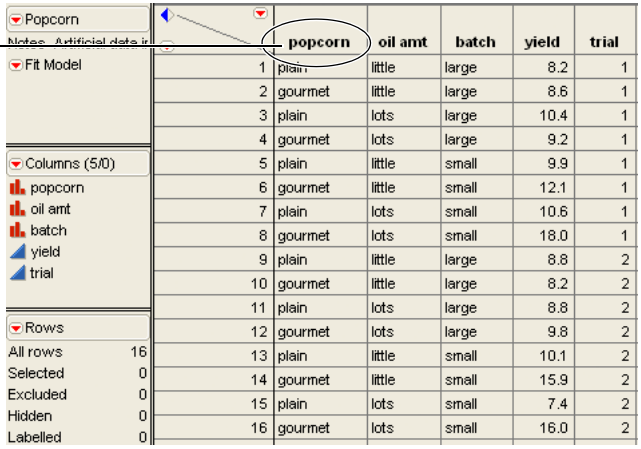
Splitting a Column: Grouping Rows Example

You can use the **Group** field in the Split window to reduce the number of rows in the new table as follows:

1 This example begins with the same Popcorn.jmp data table used in the previous example, "Splitting a Column: Basic Example," p. 233. In Figure 7.14, notice that there are only two unique values in the popcorn column: plain and gourmet. For this example, you want to split the yield column by the trial column again, but also group all the data for plain popcorn in one row and all the data for gourmet popcorn in another.

Figure 7.14 Original Data Table before Splitting and Grouping

For this example, the yield column will be split by the trial column as before. Grouping by the popcorn column will reduce the number of rows in the new table.



	popcorn	oil amt	batch	yield	trial
1	plain	little	large	8.2	1
2	gourmet	little	large	8.6	1
3	plain	lots	large	10.4	1
4	gourmet	lots	large	9.2	1
5	plain	little	small	9.9	1
6	gourmet	little	small	12.1	1
7	plain	lots	small	10.6	1
8	gourmet	lots	small	18.0	1
9	plain	little	large	8.8	2
10	gourmet	little	large	8.2	2
11	plain	lots	large	8.8	2
12	gourmet	lots	large	9.8	2
13	plain	little	small	10.1	2
14	gourmet	little	small	15.9	2
15	plain	lots	small	7.4	2
16	gourmet	lots	small	16.0	2

2 Select **Tables > Split**.

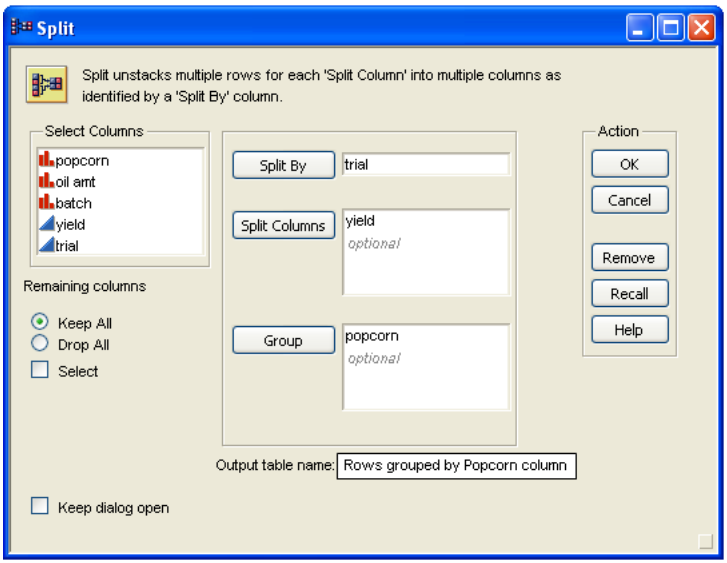
3 Drag trial to the **Split By** field and drag yield to the **Split Columns** field, and select the **Keep All** choice. (To this point, these settings are the same as those in "Splitting a Column: Basic Example," p. 233.)

4 Drag the popcorn column to the **Group** field.

5 Name the output data table Rows grouped by Popcorn column.

Figure 7.15 shows these settings.

Figure 7.15 Settings for Splitting and Grouping Data Table

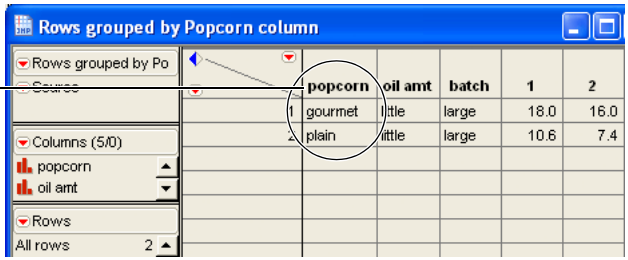


6 Click **OK**.

The new data table shown in Figure 7.16 is identical to the data table in Figure 7.12, except that the values in the popcorn column have been grouped. There are two rows (groups) in the popcorn column: one for gourmet popcorn and one for plain popcorn.

Figure 7.16

The original data table had 16 rows. Grouping the new table by the popcorn column produced a table with only two rows, one for gourmet popcorn and one for plain popcorn.



Notice that the remaining columns—the columns other than trial, yield, and popcorn—are in the new table (because the **Keep All** choice was selected in the Split window), but no other processing occurred on those columns during the split.

Transposing Rows and Columns

You can create a new JMP table that is a transposed version of the active data table. The columns of the active table are the rows of the new table, and its rows are the new table's columns.

When you transpose columns, you do the following:

- Select the columns to be transposed.

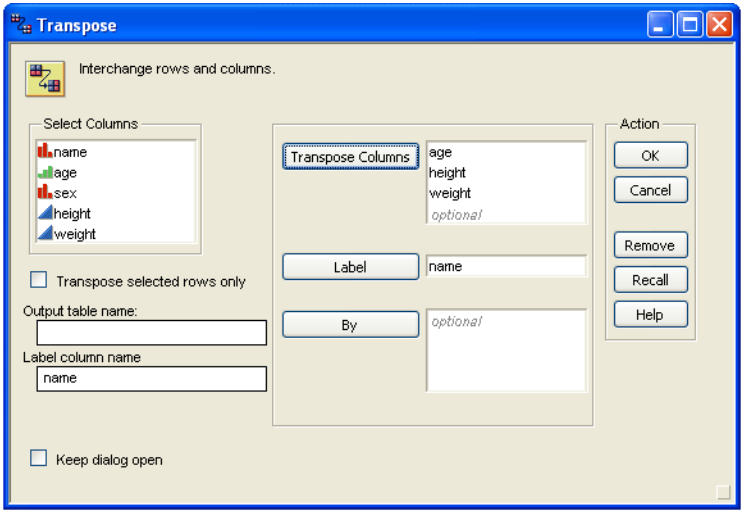
- Specify a "label" column, from which the new columns get their names (optional).
- Specify "by" columns, which tells JMP to transpose data within groups (optional).

Columns you want to transpose must have the same data type. Also, if columns contain value labels, transposing uses the actual data values, not the value labels. (See "Using Value Labels," p. 147.)

To transpose rows and columns

1 Open a data table that contains rows and columns you want to transpose.
2 Select **Tables > Transpose**. The window in Figure 7.17 appears.

Figure 7.17 Transpose Window



3 Highlight the column name(s) you want to transpose in the **Select Columns** box on the left.
4 Click **Transpose Columns**.
5 To further customize your transpose:

Option in JMP	Description
Label	To use the data from a column in the original table as the column names in the new table: 1 Highlight a column from the **Select Columns** box on the left. 2 Click **Label**. The column name appears in the **Label** box. Note that only one column is created for each distinct value in the label column. Thus, if there are duplicate values in the label column, JMP creates only one column for the duplicated value using the value from the last duplicated row.

Option in JMP	Description
By	To organize the transpose into groups based on the columns you put in the **By** box, highlight column name(s) in the **Select Columns** box whose values you want to see as a group, and click **By**.
Transpose Selected Rows Only	To transpose only rows that are currently highlighted in the active table, click the box beside **Transpose Selected Rows Only**.
Output table name	To name the subset table, type a name in the box beside **Output table name**.
Keep dialog open	To keep this window open after clicking **OK**, check the box beside **Keep Dialog Open**.

3 Click **Transpose**. The transposed data table appears. The new table will have an additional column called **Label** whose values are the column names of the original table.

The following rules apply to transposing:

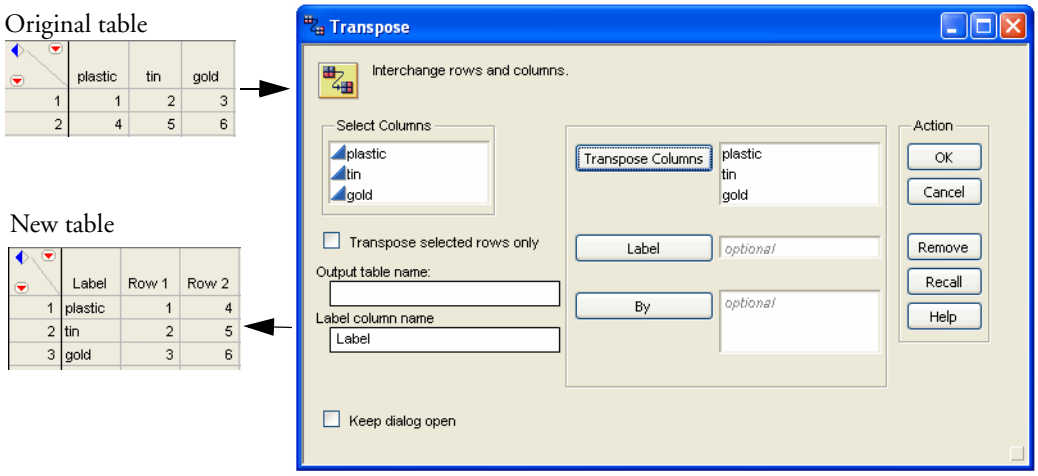
Table 7.1 Rules for Transposing

If	Then
The original table has columns but no rows	The new table contains one column that lists those column names.
The original table has one column and it is assigned to **Label**	Its values become the column names in the transposed table.
The original table has multiple columns and contains a label column	JMP automatically inserts the label column into the **Label** box when the window appears.
There is no label column in the original table	The column names in the transposed table are Row 1, Row 2, …, Row n where *n* is the number of rows in the original table.

Examples of Transposing

The original table in Figure 7.18, which is the table on the top, has two rows and three continuous columns called plastic, tin, and gold. Selecting **Tables > Transpose** creates the transposed table on the bottom of the page. The transposed table has a row for each of the three columns in the example table and columns named Row 1 and Row 2 for the original table's rows. The additional column called Labels has the column names (plastic, tin, and gold) from the original table as values, 'plastic,' 'tin,' and 'gold.'

Figure 7.18 Simple Transpose



The top table in Figure 7.19 has the same original table as is used in Figure 7.18, but it contains an additional column called item. Selecting **Tables > Transpose** and specifying that you want to use the column item as column labels in the new table creates the table shown on the bottom of the page. This new table uses values in the item column of the active table as column names in the transposed table.

Figure 7.19 Transpose with a Label

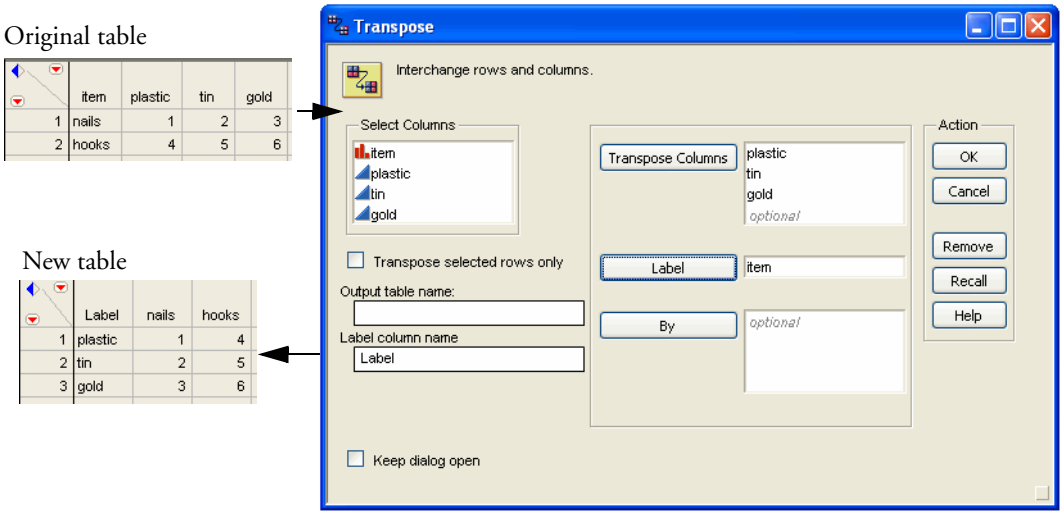
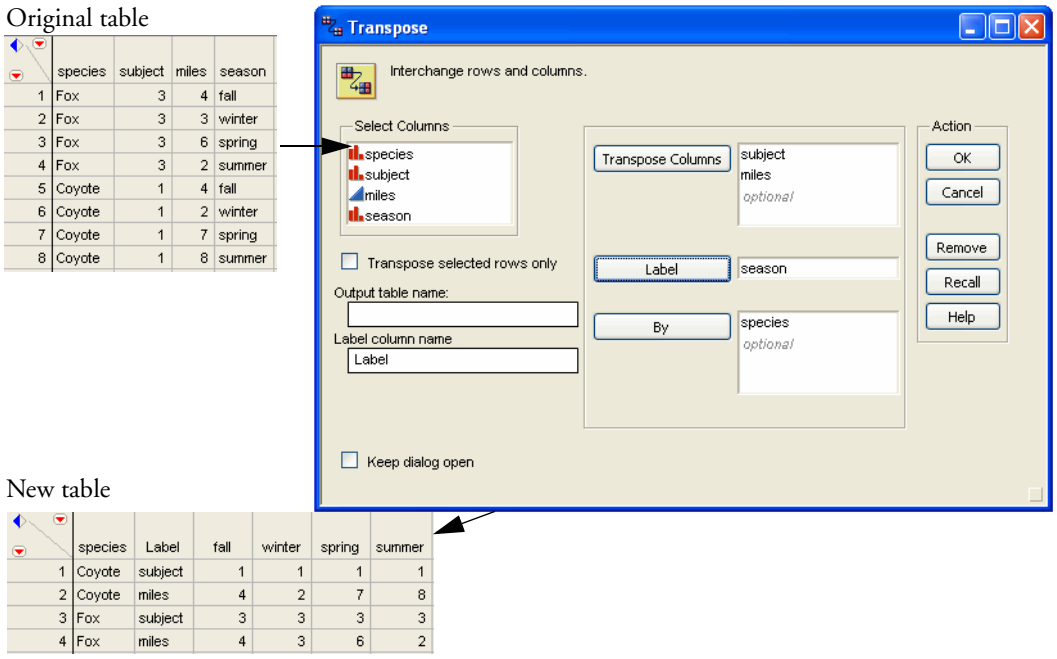


Figure 7.20 shows how to transpose groups of data without transposing across the entire data table. Selecting **Tables > Transpose** and specifying a **By** group creates the table shown on the bottom. This new table contains values that have been transposed in groups.

Figure 7.20 Transpose within Groups



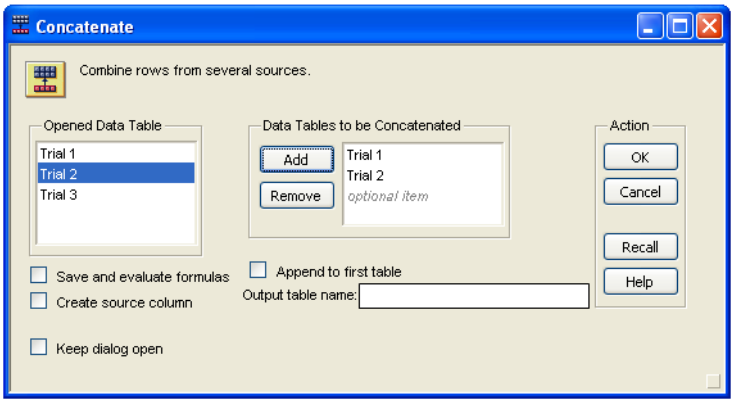
Concatenating Data Tables

When you concatenate data tables in JMP, you combine rows from two or more data tables. You can create a new data table *or* you can append rows to the first data table. If a column name is the same in the data tables you want to concatenate, the column in the new data table lists the values from all data tables in the order of concatenation. If the two original data tables have columns with different names, those columns are included in the new data table showing missing values.

To concatenate two data tables with the same column names:

1 Select **Tables > Concatenate**. The window in Figure 7.21 appears.

Figure 7.21 Concatenate Window



2 Highlight the names of the data tables you would like to combine, and click **Add**.

You can concatenate as many data tables as you choose, and you can also add the same data tables multiple times. The number of rows in the new data tables is the sum of the number of rows in all the data tables.

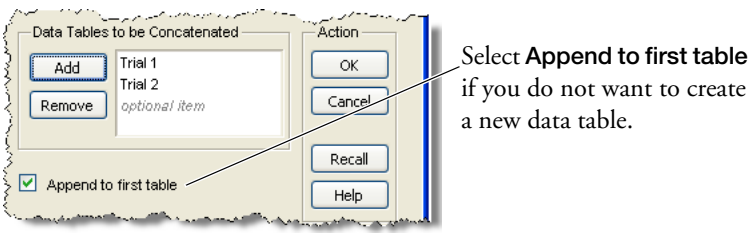
3 (Optional) Click the **Save and evaluate formulas** choice to request that JMP include all formulas. If you do not select this option, no formulas are included in the new data table.

Note: If columns with the same name have different formulas, the formula from the first data table is saved in the concatenated data table.

4 (Optional) Click the **Create source column** choice to add a column called Source Table to the new data table. This column identifies the name of the source data table in the corresponding rows.

5 (Optional) Select the **Append to first table** choice to append rows to the data table listed first in the **Data Tables to be Concatenated** field instead of creating a new data table.

Figure 7.22 Append to First Table (Optional)



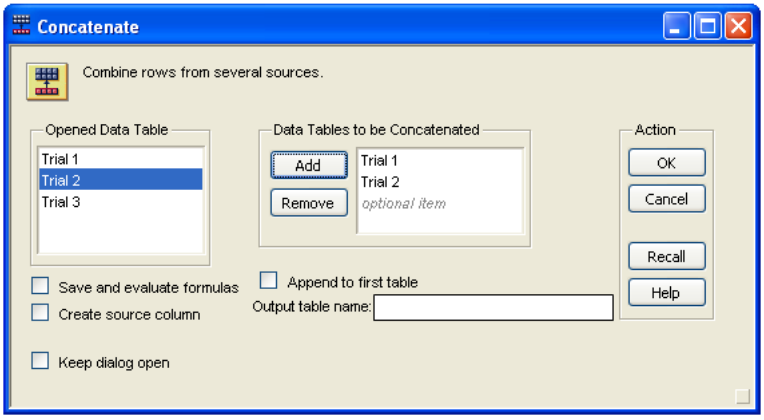
6 (Optional) Type a name for the new data table in the **Output table name** field. If you do not type a name, JMP names the data table Untitled*x* (for example, Untitled1). The **Output table name** field is not available if you selected the **Append to first table** choice.

7 Click **OK**.

Example of Concatenating Data Tables

Suppose you want to concatenate two data tables—Trial1 and Trial2—into a new data table. Select **Tables > Concatenate**, add the opened data tables you want to concatenate as shown in Figure 7.23, and then click **OK**.

Figure 7.23 Concatenate Settings



The data tables combine into a new untitled table with all rows from the first data table followed by all rows from the second data table, as shown in Figure 7.24.

Figure 7.24 Result of Concatenating Two Data Tables

Trial1.jmp

	popcorn	oil amt	batch	yield1
1	plain	little	large	8.2
2	gourmet	little	large	8.6
3	plain	lots	large	10.4
4	gourmet	lots	large	9.2
5	plain	little	small	9.9
6	gourmet	little	small	12.1
7	plain	lots	small	10.6
8	gourmet	lots	small	18.0

Trial2.jmp

	popcorn	oil amt	batch	yield2
1	plain	little	large	8.8
2	gourmet	little	large	8.2
3	plain	lots	large	8.8
4	gourmet	lots	large	9.8
5	plain	little	small	10.1
6	gourmet	little	small	15.9
7	plain	lots	small	7.4
8	gourmet	lots	small	16.0

New concatenated data table

	popcorn	oil amt	batch	yield1	yield2
1	plain	little	large	8.2	.
2	gourmet	little	large	8.6	.
3	plain	lots	large	10.4	.
4	gourmet	lots	large	9.2	.
5	plain	little	small	9.9	.
6	gourmet	little	small	12.1	.
7	plain	lots	small	10.6	.
8	gourmet	lots	small	18.0	.
9	plain	little	large	.	8.8
10	gourmet	little	large	.	8.2
11	plain	lots	large	.	8.8
12	gourmet	lots	large	.	9.8
13	plain	little	small	.	10.1
14	gourmet	little	small	.	15.9
15	plain	lots	small	.	7.4
16	gourmet	lots	small	.	16.0

Concatenated data tables always have a column for every column name found in the original data tables. In Figure 7.24, there are two columns that do not match between the data tables: yield1 and yield2, so the new concatenated data table shown has both yield1 and yield2 columns. These columns have missing values for rows from the data table in which the column did not exist.

Joining Data Tables

You can combine two data tables into one new table by selecting **Tables > Join**. Tables can be joined in three different ways:

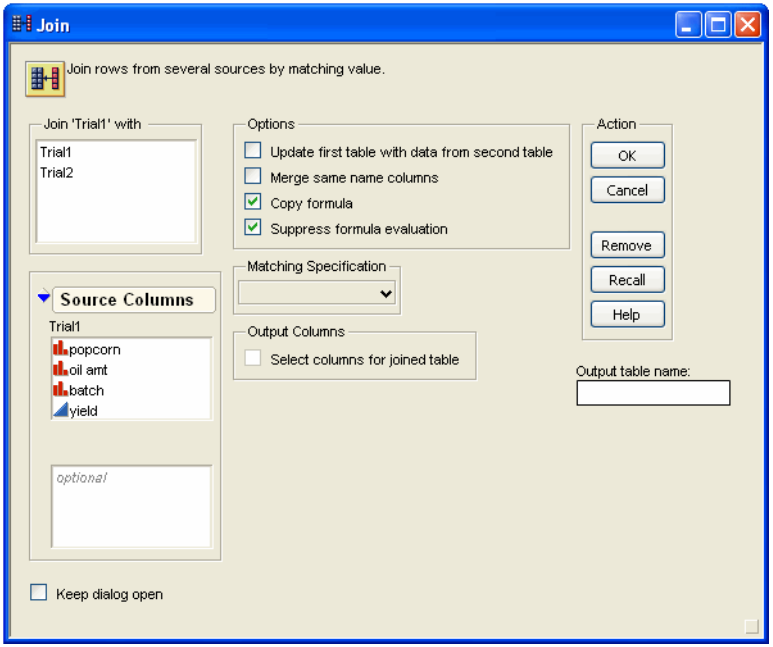
- By combining them according to row number. (See "How to Join Data Tables," p. 244, and "Example 1: Join by Row Number," p. 247.)
- In a Cartesian fashion, where you form a new table consisting of all possible combinations of the rows from two original tables. (See "How to Join Data Tables," p. 244, and "Example 2: A Cartesian Join," p. 250.)
- By matching the values in one or more columns that exist in both data tables. (See "How to Join Data Tables," p. 244, and "Example 3: Join by Matching Columns," p. 251.)

How to Join Data Tables

To join two data tables into a new one:

1 Select **Tables > Join**. In the window that appears, the names of all open tables appear below **Join...with**, as shown in Figure 7.25.

Figure 7.25 The Join Window



2 In the **Join...with** box, highlight the table to join with the active table.

3 Select the option that specifies how to join the tables from the **Matching Specification** area:

Option in JMP	Description
By Row Number	Joins the two tables side by side.
Cartesian Join	Joins two tables using a Cartesian fashion, where it forms a new table consisting of all possible combinations of the rows from two original tables. JMP crosses the data in the first table with the data in the second to display all combinations of the values in each set.
By Matching Columns	When you select this option, the window expands, prompting you to select columns whose values and data types must match in both tables for rows to be joined. You should: 1 Highlight a column name from each list in the **Source Columns** area. The first highlighted column in the top list pairs with the first highlighted column in the bottom list, the second columns are paired, and so on. Rows join only if values and data types match for all the column pairs. 2 Click **Match**. The selected pair of columns are displayed in the **Match columns** box. Matching columns do not have to have the same names and do not have to be in the same relative column position in both tables. 3 (Optional) To only include the first match found, check the boxes associated with **Drop multiples** in both tables. Only the first match found is written to the new table. If you specify this option for one table, the first match value is joined with all matches in the other table. If you do not check the boxes associated with **Drop multiples** in either table, a Cartesian join is performed within each group of matching column values. 4 (Optional) To include all rows from the data table, even when there is no matching value, check the boxes associated with **Include non-matches**. You can specify this option for either or both data tables being joined.

5 Type the name of the new table in the text box beside **Output table name**.

6 Consult the following table to further specify how to combine the data tables:

Option in JMP	Description
Select Columns for joined table	Select the **Select Columns for joined table** option if you want to select a subset of columns from either table for inclusion in the output table. Follow these steps: 1 In the **Source Columns** area, highlight the columns from each table that you want to include in the new table. 2 Click **Select** in the **Output Columns** area.

Option in JMP	Description
Update first table with data from second table	When **Update first table with data from second table** is checked, column data from the second table are used to change the data of the same name columns in the original table. Notes: • JMP will not replace data with missing values. • The output table uses the same columns as the original table. Thus, when you use **Update first table with data from second table**, **Select Columns for joined table** is not applicable. • The **Update first table with data from second table** option is available only when joining by row number or by matching columns.
Merge same name columns	Click the box beside **Merge same name columns** if you want the data from the second table to replace the data of the same name columns in the original table, regardless of if they are missing. If you join by matching columns, the new table will contain a column named Match Flag: • If a one (1) appears in this column, the data originated from the first (active) table. • If a two (2) appears in this column, the data originated from the second table. • If a three (3) appears in this column, the data was found in both the first and second tables.
Copy formula	To include formulas from the original table in the output columns, click the box beside **Copy formula**.
Suppress formula evaluation	To prevent JMP from evaluating columns' formulas during the creation of the new table, click the box beside **Suppress formula evaluation**.
Keep dialog open	To keep this window open after clicking **OK**, check the box beside **Keep Dialog Open**.

3 Click **OK** to see the new data table.

Examples of Joining Data Tables

The following sections give examples of how to use the **Join** command.

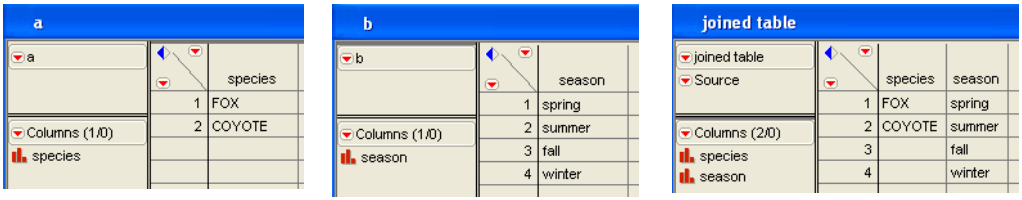
Example 1: Join by Row Number

Joining tables by row number joins the two tables side by side, and the new table has all columns from both tables (unless you specify to only include certain columns).

Joining Tables with an Unequal Number of Rows

If two tables you want to join have an unequal number of rows, the new table will have values for rows found in both tables. For example, as Figure 7.26 shows, if one table with two rows (the table on the left) is joined with a table with four rows (the table in the center), then the new table (the table on the right) contains four rows.

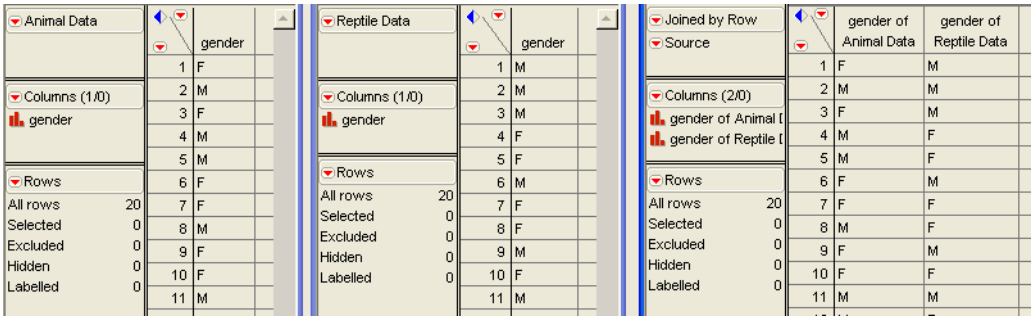
Figure 7.26 Joining Tables by Row Number



Joining Columns with the Same Name

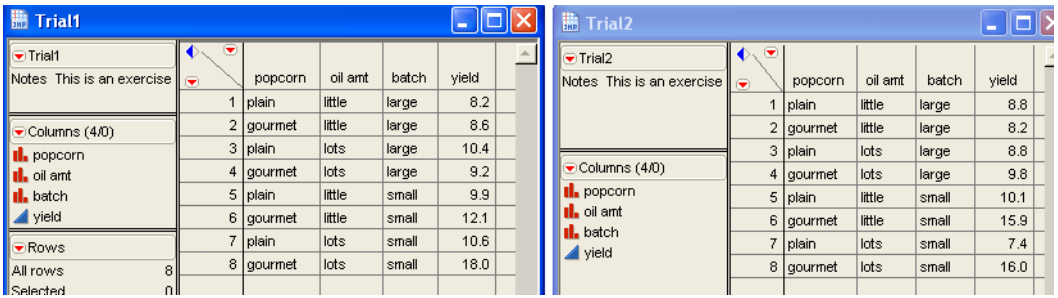
If the two tables have column names that are the same, the names of these columns in the new table appear as "column name of table name." For example, if you joined tables named Animal Data.jmp and Reptile Data.jmp, and both tables contained a column named gender, the new table contains columns named gender of Animal Data and gender of Reptile Data, as shown in Figure 7.27.

Figure 7.27 Joining Tables by Row Number



As a similar example, suppose you want to combine the eight rows from each data table shown in Figure 7.28 into a single table. You want to combine them so the new table contains all columns from both tables. Follow along with this next example by opening Trial1.jmp and Trial2.jmp from the Sample Data folder that was installed when you installed JMP.

Figure 7.28 The Trial1.jmp and Trial2.jmp Data Tables



Trial1

Trial1
Notes This is an exercise
Columns (4/0)
popcorn
oil amt
batch
yield
Rows
All rows 8
Selected 0

	popcorn	oil amt	batch	yield
1	plain	little	large	8.2
2	gourmet	little	large	8.6
3	plain	lots	large	10.4
4	gourmet	lots	large	9.2
5	plain	little	small	9.9
6	gourmet	little	small	12.1
7	plain	lots	small	10.6
8	gourmet	lots	small	18.0

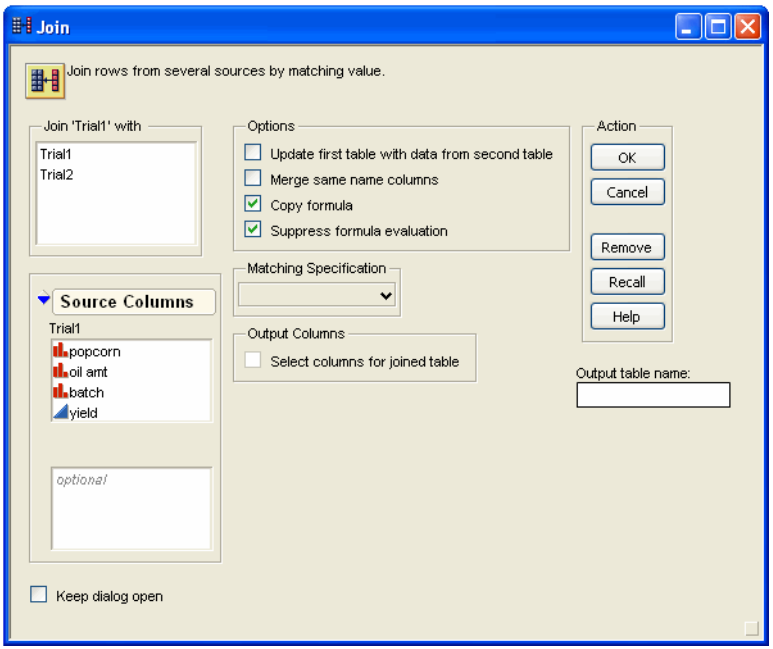
Trial2

Trial2
Notes This is an exercise
Columns (4/0)
popcorn
oil amt
batch
yield

	popcorn	oil amt	batch	yield
1	plain	little	large	8.8
2	gourmet	little	large	8.2
3	plain	lots	large	8.8
4	gourmet	lots	large	9.8
5	plain	little	small	10.1
6	gourmet	little	small	15.9
7	plain	lots	small	7.4
8	gourmet	lots	small	16.0

1 Select **Tables > Join**, and the window in Figure 7.29 appears.

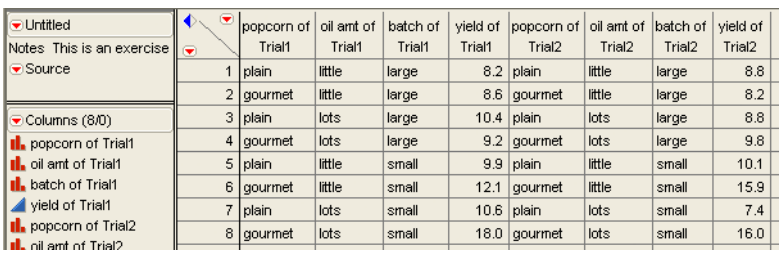
Figure 7.29 Join Window



2 Highlight Trial2 in the **Join...With** box.

3 Then click **OK** and the result is the data table in Figure 7.30.

Figure 7.30 The Joined Table



Untitled
Notes This is an exercise
Source
Columns (8/0)
popcorn of Trial1
oil amt of Trial1
batch of Trial1
yield of Trial1
popcorn of Trial2
oil amt of Trial2

	popcorn of Trial1	oil amt of Trial1	batch of Trial1	yield of Trial1	popcorn of Trial2	oil amt of Trial2	batch of Trial2	yield of Trial2
1	plain	little	large	8.2	plain	little	large	8.8
2	gourmet	little	large	8.6	gourmet	little	large	8.2
3	plain	lots	large	10.4	plain	lots	large	8.8
4	gourmet	lots	large	9.2	gourmet	lots	large	9.8
5	plain	little	small	9.9	plain	little	small	10.1
6	gourmet	little	small	12.1	gourmet	little	small	15.9
7	plain	lots	small	10.6	plain	lots	small	7.4
8	gourmet	lots	small	18.0	gourmet	lots	small	16.0

Note that if a column name is the same in the two original tables, the output column name is qualified by the source table name. For example, the column names in the new table are "*variable name* of table name."

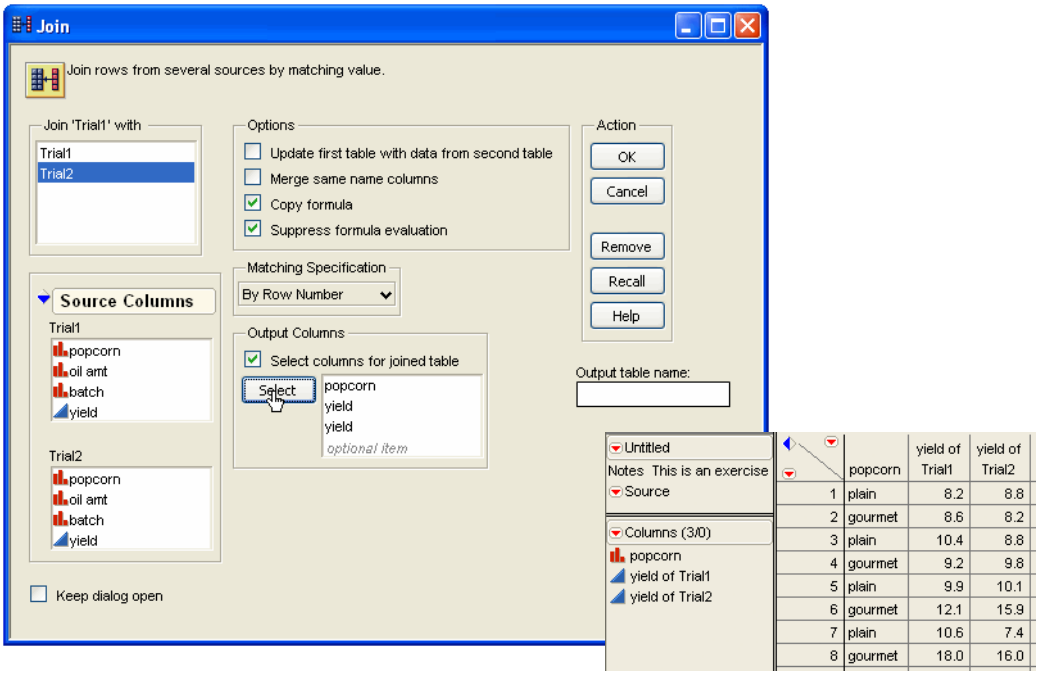
Joining Only Specified Columns

As a second example using the same data tables as the previous example, suppose you don't want all columns from the original data tables to be in the joined table. You only want popcorn and yield from Trial1 list and yield from the Trial2 to be in the joined table.

1. Select **Tables > Join**.
2. Select Trial2 in the **Join...With** box.
3. Click **Select columns for joined table** in the **Output Columns** area to specify the subset of columns you want.
4. Select all the columns you want from both tables in the **Source Columns** list and click **Select**. In this example, select popcorn and yield from Trial1 list and yield from the Trial2 list. The box in the **Output Columns** area lists the columns you want in the new table. The tables Trial1 and Trial2 (Figure 7.31) have identical data in the popcorn column, so only one of them is needed in the joined table.
5. Click **OK**.

The new table has only the selected columns, as shown in Figure 7.31.

Figure 7.31 Joining Only Specified Columns

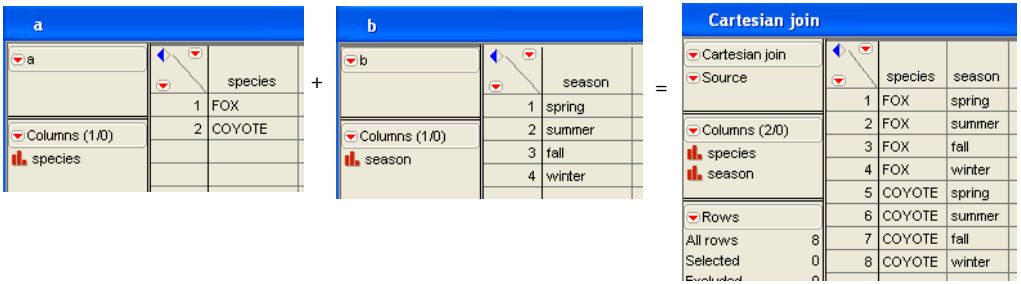


Example 2: A Cartesian Join

When doing a Cartesian join, JMP joins two tables in a Cartesian fashion, where it forms a new table consisting of all possible combinations of the rows from two original tables. This creates cases in the output table so there will be one case for each combination of column values. For example, as Figure 7.32 shows, JMP crosses the data in table a with the data in table b to display all combinations of the values in each set (the table named Cartesian join).

Figure 7.32 Joining Tables Using Cartesian Join

Original table 1 Original table 2 New table



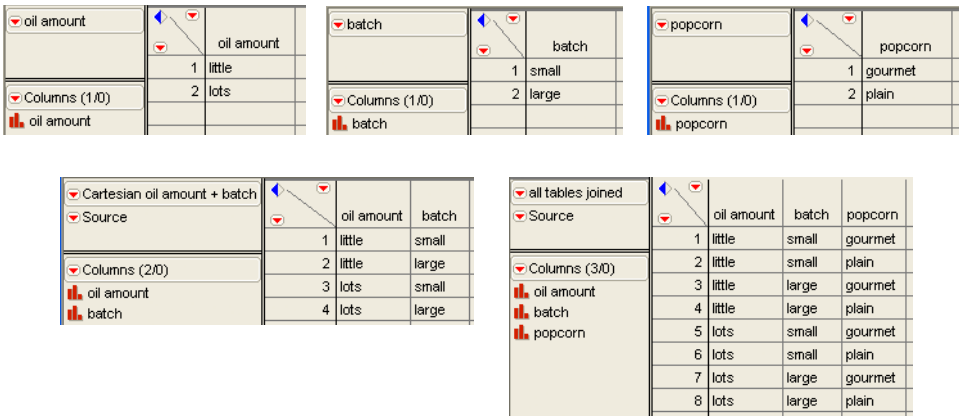
For another example, suppose you want to construct a JMP table that has a row for each combination of levels of experimental conditions in the popcorn example.

You can begin with the three small tables shown at the top in Figure 7.33: oil amount.jmp, batch.jmp, and popcorn.jmp. Each table has two rows and one column. The values are the experimental categories for popcorn yield trials.

In this example, you must use the **Tables > Join** command twice. The first join combines oil amount.jmp with batch.jmp using the Cartesian option. The join produces the lower left table in Figure 7.33, which has all columns from the two original tables. Each value in oil amount.jmp pairs with each value in batch.jmp, giving a new table with four rows.

The second join combines the new table (Cartesian oil amount + batch) with popcorn.jmp and produces the lower right table (all tables joined) in Figure 7.33. This final data table has a row for each experiment condition and is ready for recording results of the corn popping trials. Keep in mind that the number of rows produced by a Cartesian join is the product of the number of rows in the original tables.

Figure 7.33 Examples of a Cartesian Join



Example 3: Join by Matching Columns

When join by matching columns, JMP finds specified column(s) values that exist in both tables and combines all values associated with that value into a new data table. Note that to join by matching columns, the columns must have the same data type (numeric, character, or row state).

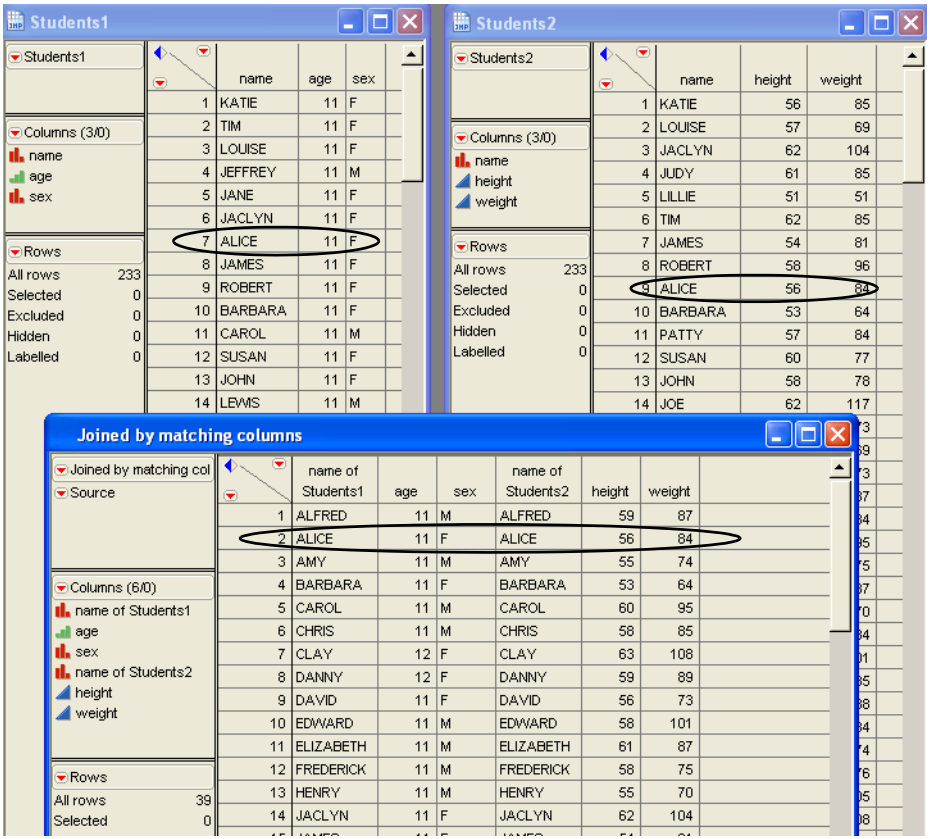
Joining Tables with the Same Rows in Different Order

Suppose you have one data table containing students' names, ages, and sexes. You have another data table containing their names, height, and weight. Instead of working with two separate tables, you would like to combine the tables into one, as shown in Figure 7.34. Then, you will be prepared to run any appropriate analyses.

You realize that the students' names are not in the same order in both tables; for example, Alice is on row 7 in the first table and row 9 in the second table.

Figure 7.34 shows the two original tables and new table you would like to create.

Figure 7.34 Joining Students1.jmp with Students2.jmp by Matching Columns



To join the tables so that the new table contains Alice's (as well as every other students') name, age, sex, height, and weight:

1 Select **Tables > Join** and select Student2 in the **Join...With** box.

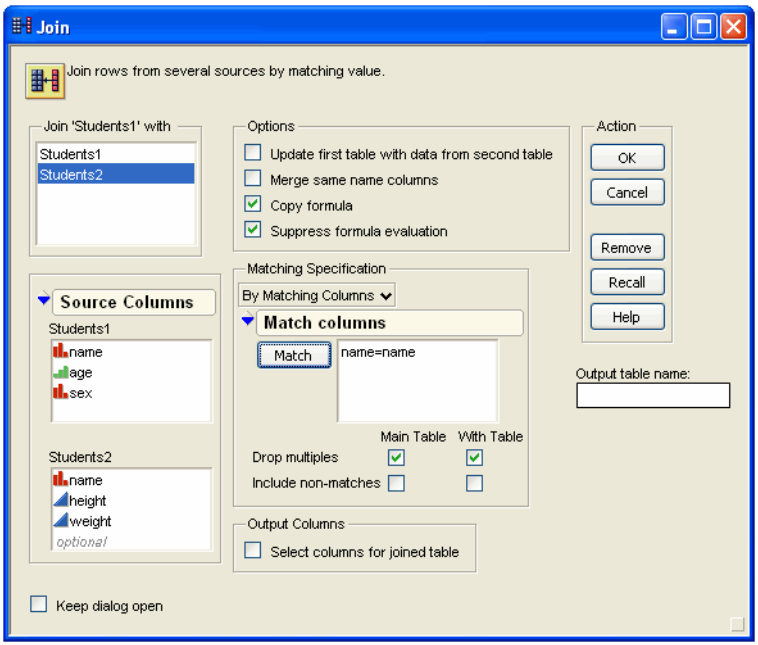
Because both tables have one column (name) that contains the same values, you need to tell JMP that they are "matches." When you do this, JMP examines each of the values in the name column of the first table to determine whether there was a corresponding value in the second table's name column. For example, it detects that **Alice** is located in both tables. It creates a name column in the new table with **Alice** as a value. It then takes the age and sex of Alice from table one and puts it in the new table. Then it takes the height and weight of Alice and puts them in the new table.

2 Select **By Matching Columns** in the **Matching Specification** area.

3 Highlight name from **Students1**'s list and name from **Student2**'s list and click **Match**. The completed window should look like that in Figure 7.35.

4 You want the new table to contain only one row for each name, so check the **Drop multiples** boxes for both tables. Then, click **OK**.

Figure 7.35 Matching Columns



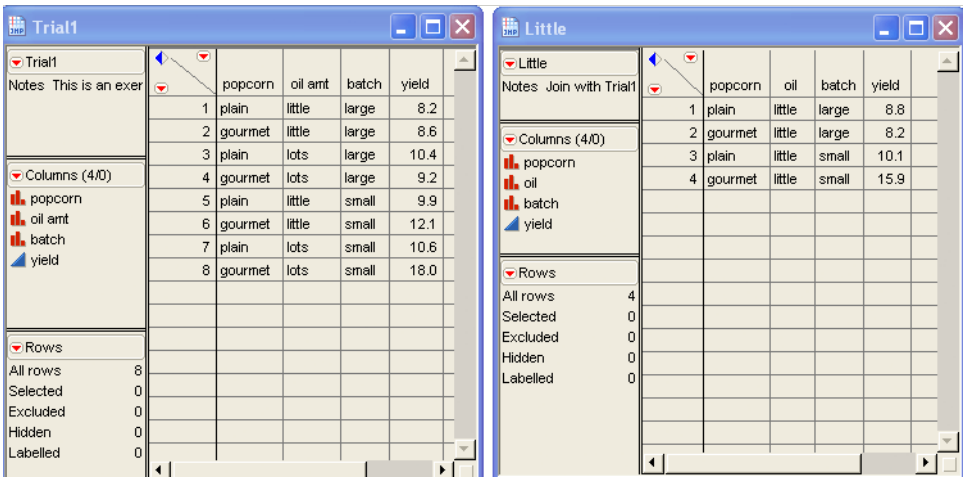
Joining Tables with Different Numbers of Rows and Different Column Names

You can follow along with this example by opening the Trial1.jmp and Little.jmp tables that are in the Sample Data folder that was installed when you installed JMP.

Suppose Sarah and Joe are running a popcorn experiment. They are popping different types of popcorn (gourmet and plain) in different amounts of oil. They are recording the amount (yield) of popcorn that is produced.

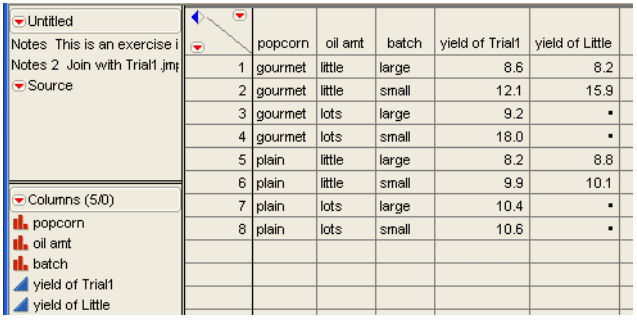
Sarah gave you the first trial data in a file named Trial1.jmp. Joe gave you the second trial data in a file named Little.jmp. Figure 7.36 shows the two tables.

Figure 7.36 Two Tables



Before examining the collected data, you realize it would be convenient to join Sarah and Joe's tables into a single table, such as the one in Figure 7.37.

Figure 7.37 How You Want the Combined Tables to Look


Untitled
Notes This is an exercise i
Notes 2 Join with Trial1 jmp
Source
Columns (5/0)
popcorn
oil amt
batch
yield of Trial1
yield of Little
popcorn oil amt batch yield of Trial1 yield of Little
1 gourmet little large 8.6 8.2
2 gourmet little small 12.1 15.9
3 gourmet lots large 9.2 .
4 gourmet lots small 18.0 .
5 plain little large 8.2 8.8
6 plain little small 9.9 10.1
7 plain lots large 10.4 .
8 plain lots small 10.6 .

To join Sarah and Joe's tables:

1 Select **Tables > Join**.

2 Identify **Little** as the table to which you want to join **Trial 1**.

Both tables have three columns (popcorn, oil amt/oil, and batch) that contain the same values. You can uniquely identify the columns in JMP as "matches." Further, because Sarah and Joe gave the oil amount column different names, you need to tell JMP that oil amt and oil "match."

3 Select **By Matching Cols** in the Matching Specification area.

4 Highlight popcorn, oil amt, and batch from Trial 1's list.

5 Highlight popcorn, oil, and batch from Little's list.

6 Click **Match**.

As you can see from Figure 7.36, Sarah completed her experiment, but Joe only partially completed his experiment. Therefore, the tables you received from Sarah and Joe have different numbers of rows:

Trial1.jmp has values for eight experimental conditions, and Little.jmp has values for only four of those conditions.

You want the new table to contain all the rows that are found in Trial1.jmp, even if that row in the Little.jmp table contains a missing value.

7 Check the **Include Non Matches** boxes for both tables.

In the new table, you only want one column for popcorn, one column for oil, and one column for batch. But, you want two columns for yield—yield from Trial 1 and yield from Little.

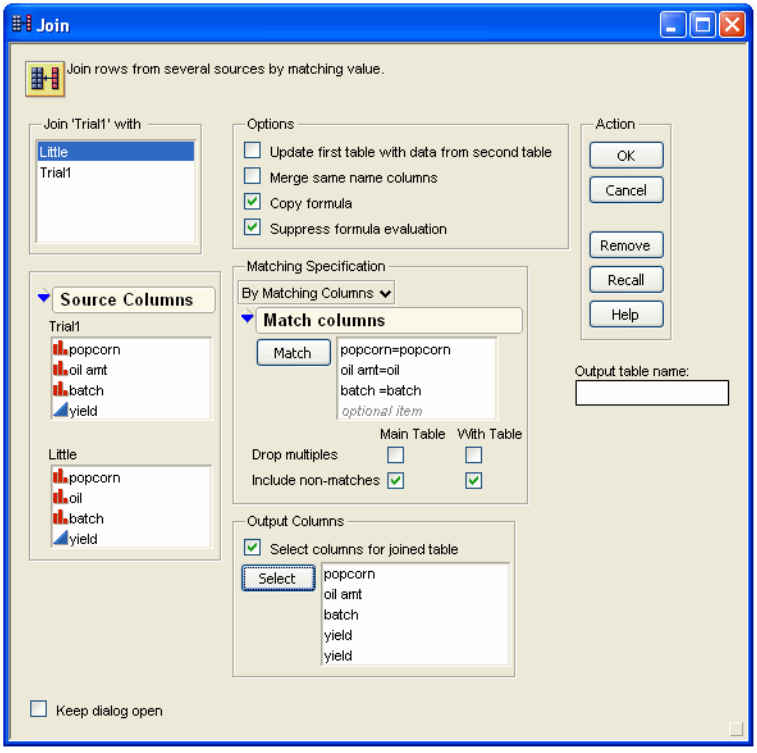
8 Check the box beside **Select columns for joined table**.

9 Highlight popcorn, oil amt, batch, and yield from Trial 1's list and click **Select**.

10 Highlight yield from **Little**'s list and click **Select**.

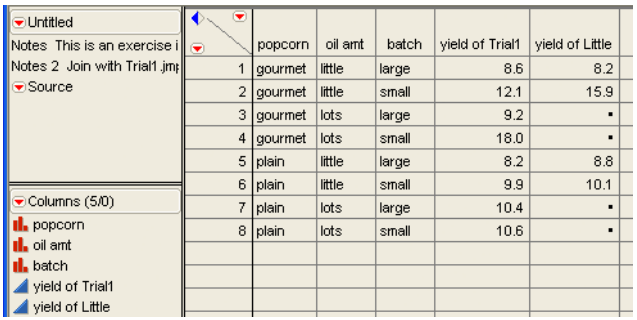
11 Ensure that the completed window matches Figure 7.38 and click **OK**.

Figure 7.38 Join by Matching Columns Window



JMP creates the table shown in Figure 7.39. The new table is now sorted by the matching columns, as shown in Figure 7.39. Note that the yield column from Little.jmp (Yield of Little) has missing values whenever there were no matching values in Trial1.

Figure 7.39 Table Joined by Matching Columns



	popcorn	oil amt	batch	yield of Trial1	yield of Little
1	gourmet	little	large	8.6	8.2
2	gourmet	little	small	12.1	15.9
3	gourmet	lots	large	9.2	.
4	gourmet	lots	small	18.0	.
5	plain	little	large	8.2	8.8
6	plain	little	small	9.9	10.1
7	plain	lots	large	10.4	.
8	plain	lots	small	10.6	.

Updating a Data Table

If you have two data tables and would like to update one table with data from a second table, select **Tables > Update**. The **Update** command is a special case of **Join** in place. It is a Join with the **Update** option checked, and no new table.

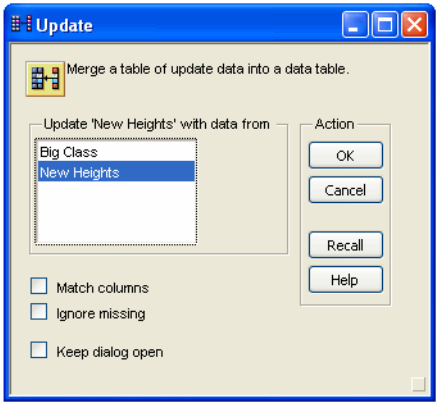
Before updating a table, make sure the name of the column containing the values you want to replace is the same as the name of the column containing the data you want to replace it with.

To replace values in the active table with those found in another open table

1 Click the table you want to update (this is the table whose values will be replaced) to make it the active table.

2 Select **Tables > Update**. In the window that appears, the name of the active table is shown above the list, as shown in Figure 7.40.

Figure 7.40 Updating a Table



3 Highlight the table that contains the data you want to transfer.

4 If you do not want JMP to replace the values in the first table with any missing values found in the second table, click the box beside **Ignore missing**. The first table will retain its original values if they

correspond to missing values in the second table.

If your two tables have one or more columns whose values uniquely describe each row, JMP will use those columns as the *match column values*. That is, JMP updates the rows whose match column values coincide. JMP uses these columns to preserve the sorted order of the data. If your tables do not have matching column values, you can incorporate the updated values according to their row order by continuing here. To proceed with tables containing matching column values, see

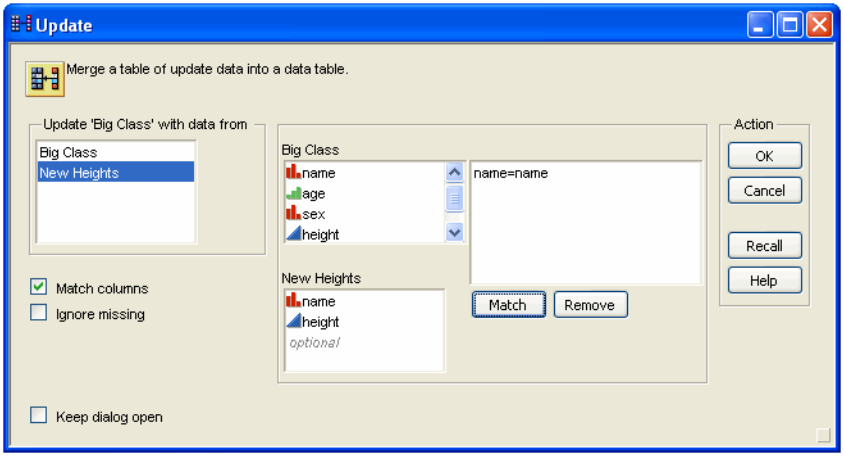
5 Click **OK**.

To update a table using matching columns

1 Follow the first four steps outlined in the previous section, "To replace values in the active table with those found in another open table," p. 256.

2 Check **Match columns**. Figure 7.41 appears.

Figure 7.41 This Window Appears When You Click Match Columns



3 Highlight two column names (in the respective tables) that you want to match.

4 Click **Match**.

5 Repeat to match more columns.

6 Click **OK** in this window to close it, and then click **OK** in the Update window.

Note: Any columns that have different names from the columns in the table you are updating (and that have not been assigned matches) are appended as separate columns.

Example of Updating a Data Table

Suppose a researcher has a data table named Big Class.jmp when she receives a second table named NewHeights.jmp (Figure 7.42), which contains more recent measurements of the students' height.

The researcher wants to avoid scrolling through Big Class.jmp to find the students whose height has changed. She also wants to avoid copying and pasting or typing in the new values. She wants to quickly update Big Class.jmp with the more recent height values, which are found in NewHeights.jmp.

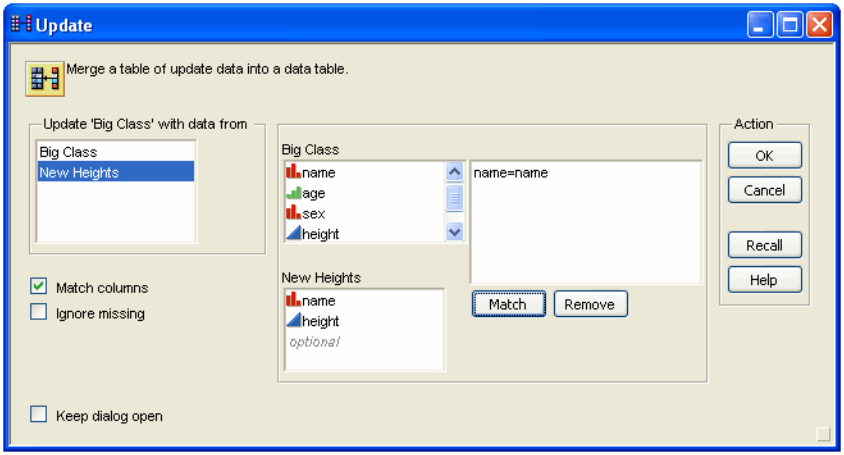
Figure 7.42 BigClass.jmp (Left) and NewHeights.jmp (Right)

	name	age	sex	height	weight
1	KATIE	12	F	59	95
2	LOUISE	12	F	61	123
3	JANE	12	F	55	74
4	JACLYN	12	F	66	145
5	LILLIE	12	F	52	64
6	TIM	12	M	60	84
7	JAMES	12	M	61	128
8	ROBERT	12	M	51	79
9	BARBARA	13	F	60	112
10	ALICE	13	F	61	107
11	SUSAN	13	F	56	67
12	JOHN	13	M	65	98
13	JOE	13	M	63	105
14	MICHAEL	13	M	58	95
15	DAVID	13	M	59	79

	name	height
1	KATIE	62
2	LOUISE	61
3	JANE	67
4	JACLYN	61
5	LILLIE	57
6	TIM	59
7	JAMES	70
8	ROBERT	62
9	BARBARA	65
10	ALICE	63
11	SUSAN	62
12	JOHN	63
13	JOE	64
14	MICHAEL	65
15	DAVID	64

She opens both tables and selects **Tables > Update**. She selects NewHeights.jmp (Figure 7.43). She then clicks **Match Columns** and, in the window that appears, selects name in the column list for both tables and clicks **Match**. This tells JMP to use name as the match column value because it is the column whose values uniquely describe each row.

Figure 7.43 Updating BigClass.jmp with NewHeights.jmp



The resulting updated table is shown in Figure 7.44.

Figure 7.44 The Updated Table

	name	age	sex	height	weight
1	KATIE	12	F	62	95
2	LOUISE	12	F	61	123
3	JANE	12	F	67	74
4	JACLYN	12	F	61	145
5	LILLIE	12	F	57	64
6	TIM	12	M	59	84
7	JAMES	12	M	70	128
8	ROBERT	12	M	64	79
9	BARBARA	13	F	65	112
10	ALICE	13	F	63	107
11	SUSAN	13	F	62	67
12	JOHN	13	M	63	98

Chapter 8

Summarizing Data

The Summarize and Tabulate Commands

You can perform a wide variety of data management tasks on JMP data:

- Create a table that contains columns of summary statistics
- Tabulate data so it is displayed in a tabular format

Contents

Summarizing Columns 263
Creating a Summary Table 264
Adding a Statistics Column to an Existing Summary Table 266
Explanation of Statistics 266
Example of Adding a Statistics Column 268
Tabulating Data 269
How to Create a Table in Tabulate 270
Elements of a Table in Tabulate 271
Clicking and Dragging Items 274
Inserting a Grouping Column 275
Inserting an Analysis Column 275
Using the Window 275
Editing Tables in Tabulate 277
Additional Tabulate Options 279
Example of Tabulating Data 280

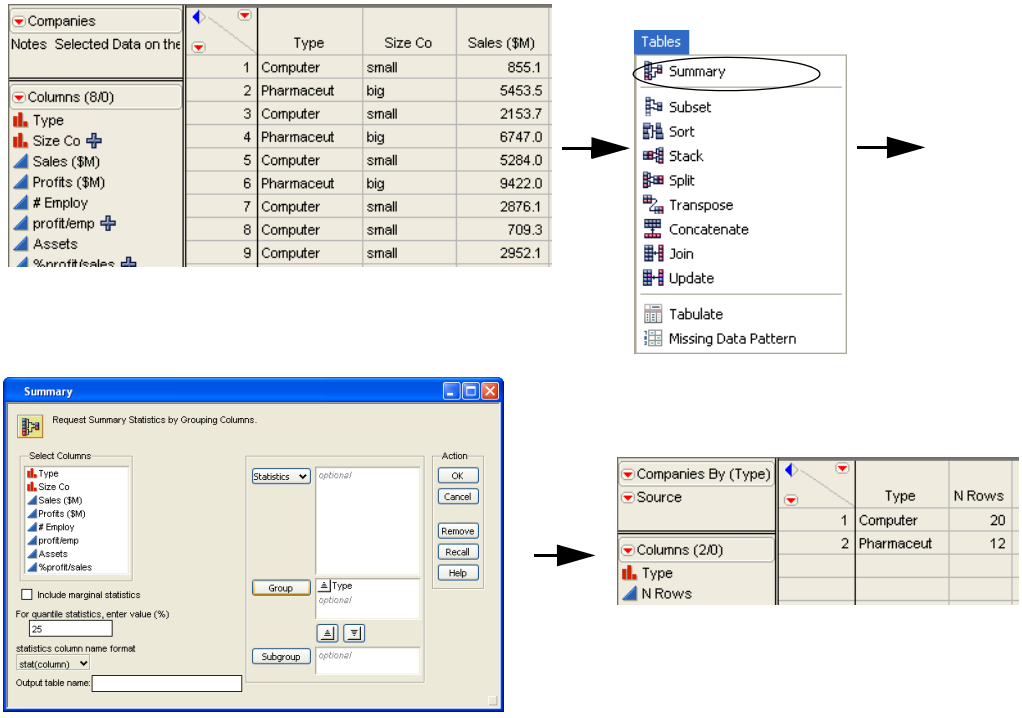
Summarizing Columns

The **Tables > Summary** command calculates various summary statistics, including the mean and median, standard deviation, minimum and maximum value, range, percentage of total, sum variance, standard error, coefficient of variation, and user-specified quantiles.

In a summary table:

- A single row exists for each level of a grouping variable you specify. If no grouping variable is specified, a single row exists for the full data table.
- When there are several grouping variables, the table contains rows for each combination of levels of all the grouping variables.
- In addition to one column for each grouping variable, the table contains frequency counts in a column named N Rows with counts for each grouping level.
- The summary table is linked to its source table. When you select rows in the summary table, the corresponding rows are highlighted in its source table.
- If the source table's column(s) contain value labels, the value labels are displayed in the new table.
- A summary table is not saved when you close it unless you select **File > Save As** to give it a name and location.

Figure 8.1 Example of Creating a Summary Table with One Grouping Variable



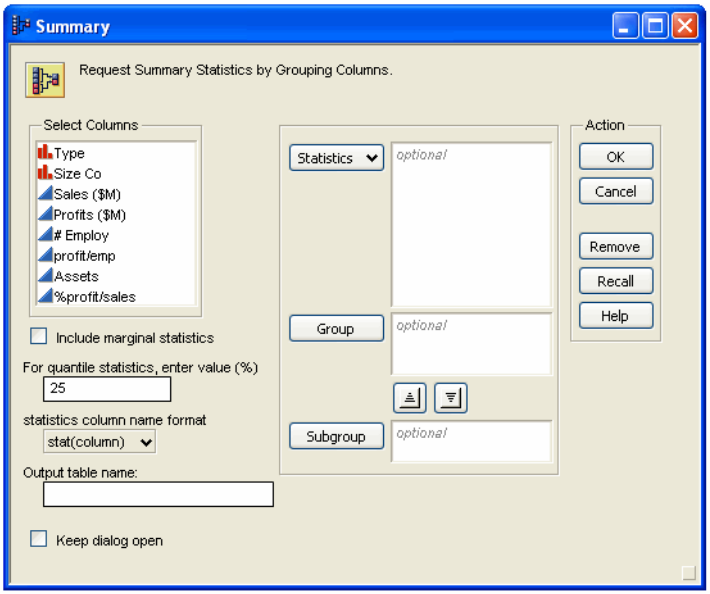
Creating a Summary Table

To create a summary table

1 Open a data table.

2 Select **Tables > Summary.** The window in Figure 8.2 appears.

Figure 8.2 The Summary Window



3 Add summary statistics, groups, subgroups, and select any options needed:

- "Adding summary statistics," p. 264
- "Using one or more grouping columns," p. 265
- "Using quantile statistics," p. 265
- "Changing the format of the statistics column name," p. 265
- "To create a two-way table of summary statistics by adding a subgroup variable," p. 265

4 Name the subset table by typing a name in the box beside **Output table name**.

5 Click **OK**.

Adding summary statistics

You can add columns that display summary statistics (such as mean, standard deviation, median, and so on) for any numeric column in the source table.

1 In the Summary window, highlight the column you want to use in calculating the statistics.

2 Click the **Statistics** button.

3 Select one of the standard univariate descriptive statistics from the **Statistics** drop-down menu. The statistics are described in "Explanation of Statistics," p. 266. The example in Figure 8.7 shows how to generate the mean of Profits/Emp for each level of the grouping variable.

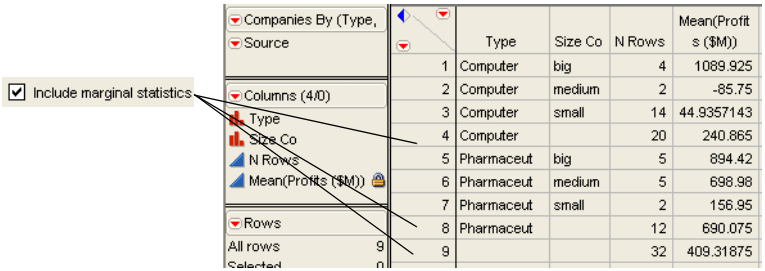
Using one or more grouping columns

If you want the statistics summarized by group, highlight the column(s) you want to be your grouping variables and click **Group** to move the variable into the grouping variables list. See "Example of Adding a Statistics Column," p. 268, for an example. If you add only grouping variables, the summary table shows a count for each group.

To change the order that the values of the grouping variables will be listed (ascending or descending order), select a variable in the grouping variable list and click the ascending/descending buttons ( ). The icon beside the variable changes to indicate the sorting order.

To add marginal statistics (for the grouping variables) to the output columns, click the box beside **Include marginal statistics**. In addition to adding marginal statistics for each grouping variable, JMP adds a row at the end of the table that shows the summary statistics for the whole table. Figure 8.3 shows the summary table for grouping variables Type and Size Co with marginal statistics.

Figure 8.3 Summary Table with Marginal Statistics



	Type	Size Co	N Rows	Mean(Profits ($M))
1	Computer	big	4	1089.925
2	Computer	medium	2	-85.75
3	Computer	small	14	44.9357143
4	Computer		20	240.865
5	Pharmaceut	big	5	894.42
6	Pharmaceut	medium	5	698.98
7	Pharmaceut	small	2	156.95
8	Pharmaceut		12	690.075
9			32	409.31875

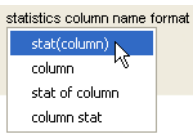
Using quantile statistics

To add specific quantile statistics, type the desired quantile value (%) for the first quantile (for example, 25) in the box under **For quantile statistics**.

Changing the format of the statistics column name

To change the format of the statistics column name, select from one of the formats in the **statistics column name format** drop-down menu. Figure 8.4 shows the available options. By default, the form is statistic(source column), where statistic is the selection made on the summary window, and source column is the column from the source table selected in the summary window.

Figure 8.4 Change the Way the Column Name Appears



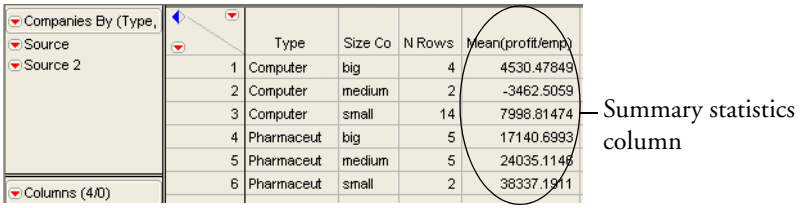
To create a two-way table of summary statistics by adding a subgroup variable

1 Highlight the column(s) you want to be the nested variable(s). These will be your "subgroup variable(s)."
2 Click **SubGroup** to move the variable(s) into the subgroup list.
3 Highlight the column for which you want statistics summarized by subgroup.
4 Click **OK**.

Adding a Statistics Column to an Existing Summary Table

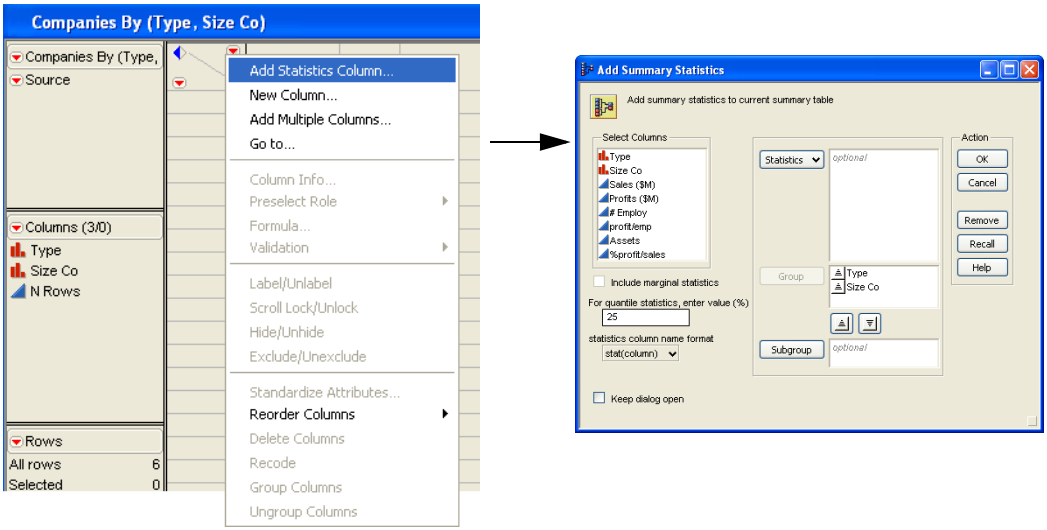
After you have created a summary table, you can add columns of descriptive summary statistics for any numeric column in the source table, as shown in Figure 8.5.

Figure 8.5 Example of a Summary Table with a Summary Statistics Column



To add a statistics column to a previously created the summary table (as explained in "Creating a Summary Table," p. 264), click the red triangle icon in the upper left corner of the data grid, as shown in Figure 8.6, and select **Add Statistics Column**. This displays the Summary window.

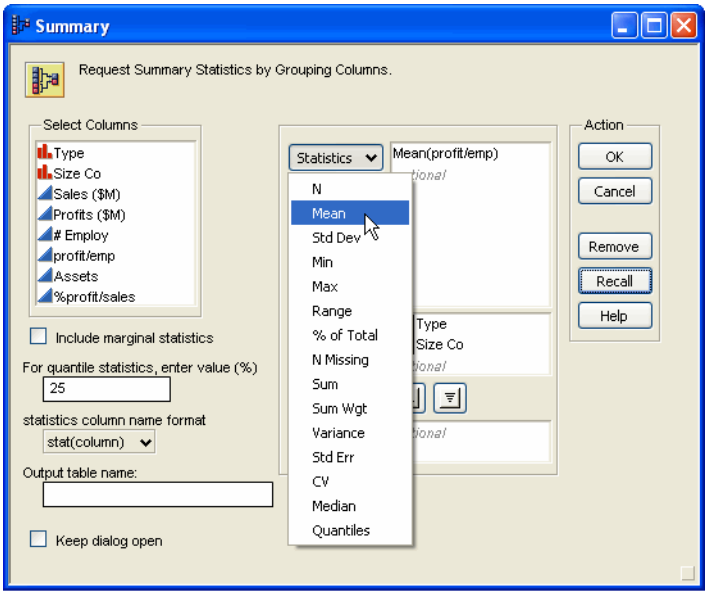
Figure 8.6 Creating a Summary Statistics Column from Within a Data Table



Explanation of Statistics

You can add columns of descriptive summary statistics for any numeric column in the source table by clicking the **Statistics** button (Figure 8.7) and selecting one of the standard univariate descriptive statistics from the **Statistics** drop-down menu described below.

Figure 8.7 Adding Summary Statistics



The **Statistics** drop-down menu gives these summary statistics for numeric columns:

- **N** Is the number of nonmissing values.
- **Mean** Is the arithmetic mean of a column's values. It is the sum of nonmissing values (and if defined, multiplied by the **weight** variable) divided by the **Sum Wgt**.
- **Std Dev** Is the sample standard deviation, computed for the nonmissing values. It is the square root of the sample variance.
- **Min** Is the smallest nonmissing value in a column.
- **Max** Is the largest nonmissing value in a column.
- **Range** Is the difference between **Max** and **Min**.
- **% of Total** Is the percent of the total count for each group. Or, if you have so specified, the percent of nonmissing values of the column to the total count for each group.
- **N Missing** Is the number of missing values.
- **Sum** Is the sum of all values in a column.
- **Sum Wgt** Is the sum of all **weight** values in a column. (See "Giving Columns a Preselected Analysis Role," p. 138.) Or, if no column is assigned the **weight** role, **Sum Wgt** is the total number of nonmissing values.
- **Variance** Is the sample variance, computed for the nonmissing values. It is the sum of squared deviations from the mean, divided by the number of nonmissing values minus one.
- **Std Err** Is the standard error of the mean. It is the standard deviation divided by the square root of **N**. If a column is assigned the role of weight, then the denominator is the square root of the sum of the weights.
- **CV** (Coefficient of Variation) Is the measure of dispersion, which is the standard deviation divided by the mean multiplied by one hundred.

- **Median** Is the 50th percentile, which is the value where half the data are below and half are above or equal to the 50th quantile (median).
- **Quantiles** Gives the value at which the specific percentage of the argument is less than or equal to. For example, 75% of the data is less than the 75th quantile. The summary window has an edit box for entering the quantile percentage you want.

Example of Adding a Statistics Column

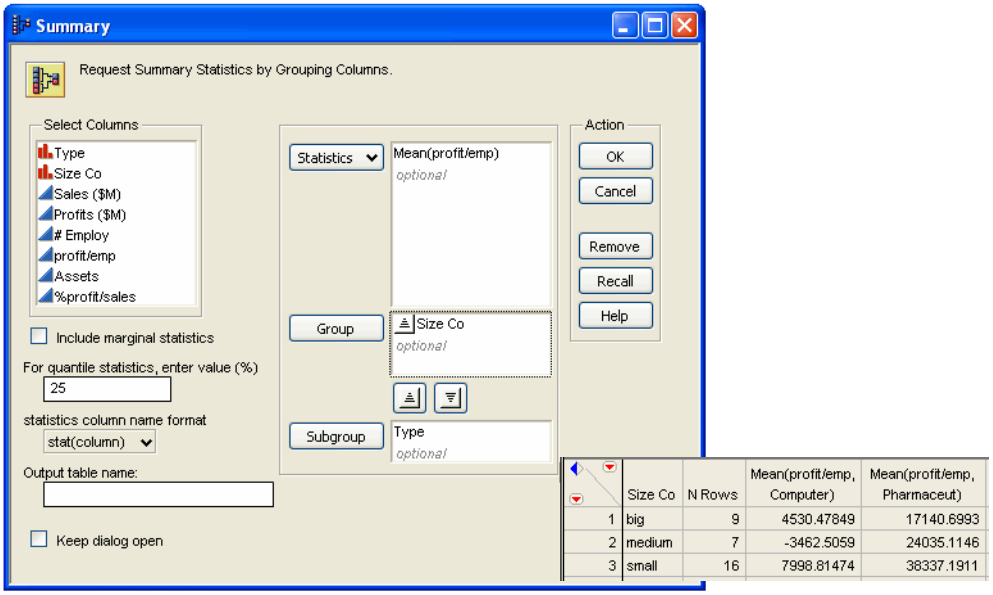
Suppose a researcher is working with Companies.jmp, which groups companies by Type and Size. Follow along with this next example by opening Companies.jmp from the Sample Data folder that was installed when you installed JMP.

Suppose the researcher wants to:

- Create a table that shows the average profit per employee for small, medium, and big computer companies *and* small, medium, and big pharmaceutical companies (in other words, a table that contains a row for each size company and a column for the mean profit per employee of each type of company).
- Create it so the cells hold the mean for the subgroup (defined by the intersection of the row and column).

The researcher first selects **Tables > Summary**, and then selects Size Co as the grouping variable because he wants the values in that column to become rows in the new table. Then he highlights profit/emp and clicks the **Statistics** button and selects **Mean** from the drop-down menu to get the mean of profit/emp. Then he highlights type and clicks the **Subgroup** button to identify it as the subgroup variable. This tells JMP to create a column for the average profit per employee (Mean(profit/emp)) for each level (computer, pharmaceutical) of subgroup variable (type). The result is the summary table shown in Figure 8.8.

Figure 8.8 Summary Statistics for a Subgroup



Tabulating Data

Use the **Tables > Tabulate** command for constructing tables of descriptive statistics. The tables are built from grouping columns, analysis columns, and statistics keywords. Through its interactive interface for defining and modifying tables, the Tabulate command provides a powerful and flexible way to present summary data in tabular form, as shown in Figure 8.9.

Figure 8.9 Examples of Tables

	sex											
	F						M					
	age						age					
	12	13	14	15	16	17	12	13	14	15	16	17
	weight	weight	weight	weight	weight	weight	weight	weight	weight	weight	weight	weight
Min	64	67	81	92	112	116	79	79	92	104	128	134
Mean	100.2	95.3	96.6	102.0	113.5	116.0	97.0	94.3	103.9	110.8	128.0	153.0
Max	145	112	142	112	115	116	128	105	119	128	128	172

		sex							
		Female				Male			
		marital status				marital status			
		Married		Single		Married		Single	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
country	size	age	age	age	age	age	age	age	age
American	Large	33.6	8.107	41.0	.	34.7	3.931	32.0	6.265
	Medium	31.4	5.827	29.0	9.258	31.3	5.413	32.1	11.05
	Small	31.0	5.657	29.0	9.539	31.8	4.813	26.5	6.455
European	Large	34.0	7.071	28.0	.	.	.	26.0	.
	Medium	31.0	5.06	28.7	5.508	32.3	5.62	31.0	10.13
	Small	29.8	6.611	28.0	1.414	33.8	4.381	25.7	2.517
Japanese	Large	25.0	.	.	.	32.0	.	.	.
	Medium	30.5	4.993	28.0	3.071	32.3	3.878	27.4	5.016
	Small	29.6	4.251	31.1	9.562	29.8	5.357	28.7	4.739
country									
American		31.9	6.452	30.0	9.115	32.6	4.919	31.0	8.179
European		31.0	5.612	28.3	3.559	33.3	4.608	28.4	7.328
Japanese		29.8	4.54	30.1	8.113	30.9	4.822	28.3	4.781

		Mean		
Type	Size Co	Profits ($M)	Sales ($M)	profit/emp
Computer	big	1089.9	20597.48	4530.478
	medium	-85.75	3018.85	-3462.51
	small	44.94	1758.06	7998.815
	All	240.87	5652.02	6159.015
Pharmaceut	big	894.42	7474.04	17140.70
	medium	698.98	4261.06	24035.11
	small	156.95	1083.75	38337.19
	All	690.08	5070.25	23546.12
All		409.32	5433.86	12679.18
Type				
Computer		240.87	5652.02	6159.015
Pharmaceut		690.08	5070.25	23546.12
All		409.32	5433.86	12679.18

How to Create a Table in Tabulate

A report in Tabulate consists of one or more column tables concatenated side by side, and one or more row tables concatenated top to bottom. A report might have only a column table or a row table.

Creating a table using the interactive table is an iterative process:

1 Click and drag the items (column name from the column list or statistics from the keywords list) from the appropriate list. Refer to the description of the elements in the interactive table in "Elements of a Table in Tabulate," p. 271.

Note: If you prefer to use a window rather than the interactive table, see "Using the Window," p. 275, for details.

2 Drop the items on the dimension (row table or column table) where you want to place the items' label. (See "Clicking and Dragging Items," p. 274, and "Elements of a Table in Tabulate," p. 271, for details.)

3 After creating a table, add to it by repeating the above process. The table updates to reflect the latest addition. If there are already column headings or row labels, you decide where the addition goes relative to the existing items.

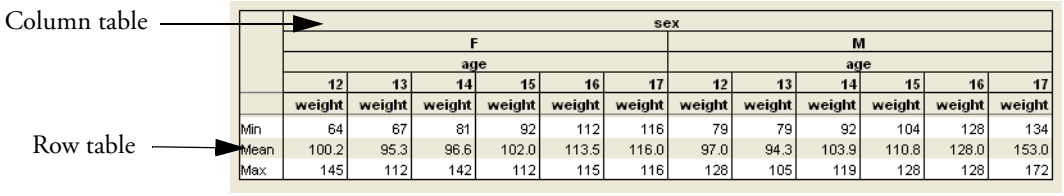
Elements of a Table in Tabulate

This section defines the terms used in tabulate.

Column Table and Row Table

In Tabulate, a table is defined by its column headings and row labels. They are henceforth referred to as the column table and row table.

Figure 8.10 Example of a Column Table and Row Table



	sex											
	F						M					
	age						age					
	12	13	14	15	16	17	12	13	14	15	16	17
	weight	weight	weight	weight	weight	weight	weight	weight	weight	weight	weight	weight
Min	64	67	81	92	112	116	79	79	92	104	128	134
Mean	100.2	95.3	96.6	102.0	113.5	116.0	97.0	94.3	103.9	110.8	128.0	153.0
Max	145	112	142	112	115	116	128	105	119	128	128	172

Grouping Columns

Grouping columns are columns that you want to use to classify your data into categories of information. They can have character, integer, or even decimal values, but the number of unique values should be limited.

If there is more than one grouping column, Tabulate constructs distinct categories from the hierarchical nesting of the values of the columns.

For example, from the grouping columns Sex with values F and M, and the grouping column Marital Status with values Married and Single, Tabulate will construct four distinct categories, F and Married, F and Single, M and Married, M and Single.

You can specify grouping columns for column tables as well as row tables. Together they generate the categories that define each table cell.

Tabulate does not include observations with a missing value for one or more grouping columns by default. You can include them by checking the **Include missing for grouping columns** option.

Analysis Columns

Analysis columns are any numeric columns for which you want to compute statistics. They are usually continuous columns. Tabulate computes statistics on the analysis columns for each category formed from the grouping columns.

Note that all the analysis columns have to reside in the same dimension, either in the row table or in the column table.

Statistics

Tabulate supports a list of standard statistics. The list is displayed in the control panel. You can drag any keyword from that list to the table, just like you do with the columns.

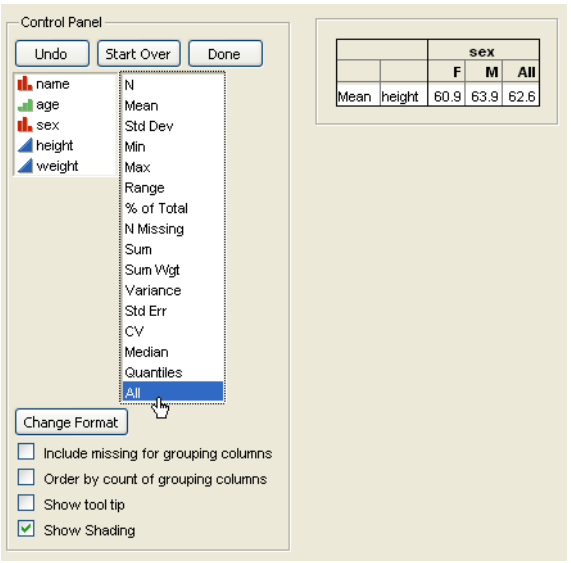
The statistics associated with each cell are calculated on values of the analysis columns from all observations in that category as defined by the grouping columns.

Note also that all the requested statistics have to reside in the same dimension, either in the row table or in the column table.

Some of the keywords used in Tabulate are defined below. A comprehensive description is listed in "Explanation of Statistics," p. 266.

- N is the default statistics when there is no analysis column.
- Sum is the default statistics for analysis columns when there is no other statistics for the table.
- Quantiles gives the value at which the specific percentage of the argument is less than or equal to. For example, 75% of the data is less than the 75th quantile. You can request different quantiles by clicking and dragging the Quantiles keyword into the table, and then entering the quantile into the box that appears.
- % of Total computes the percentage of total of the whole population. The denominator used in the computation is the total of all the included observations, and the numerator is the total for the category. If there is no analysis column, the % of Total is the percentage of total of counts. If there is an analysis column, the % of Total is the percentage of the total of the sum of the analysis column. Thus, the denominator is the sum of the analysis column over all the included observations, and the numerator is the sum of the analysis column for that category. Just like quantiles, you can request different percentages by dragging the keyword into the table, and then modifying the definition by changing the denominator.
  - Dropping one or more grouping columns from the table to the % of Total heading changes the denominator definition. For this, Tabulate will use the sum of these grouping columns for the denominator.
  - To get the percentage of the column total, drag all the grouping columns on the row table and drop them on the % of Total heading. Similarly, to get the percentage of the row total, drag all grouping columns on the column table and drop them on the % of Total heading.
- All is a special keyword for grouping columns. It is used when you want to aggregate summary information for categories of a grouping column. For example, suppose one of the grouping columns in a table is Sex with two categories, F and M. Adding the keyword All creates a third category called All, as shown in Figure 8.11. This category aggregates the statistics for both groups, F and M. This keyword is added to the table separate from the statistics keywords or from the columns.
  To aggregate for sex, drag the keyword All and drop it on the column heading Sex.

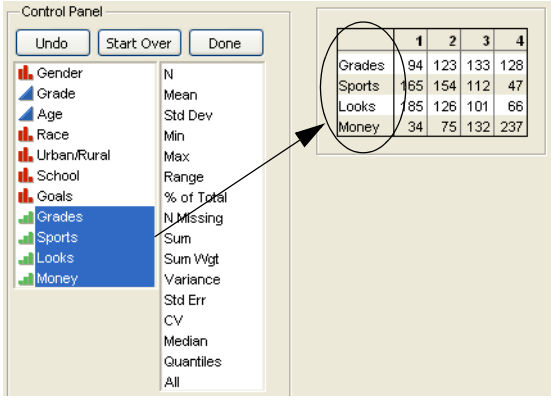
Figure 8.11 Using the "All" Keyword



Columns by Categories

Columns by Categories is a variant of grouping columns, and is an option that appears when you drag multiple columns to the Table. They are independent grouping columns sharing a common set of values. When a set of grouping columns is used collectively as **Columns by Categories**, a crosstabulation of the column names and the categories gathered from these columns is generated. Each cell is defined by one of the columns and one of the categories. If **Columns by Categories** is defined on the Column table, then the corresponding categories are automatically used to define the row table.

Columns by categories



For example, researchers collected data on the importance of self-reported factors in children's popularity. The top table in Figure 8.12 tabulates the percentage of the one to four ratings of each category. It was made by adding Grades, Sports, Looks, and Money as **Columns by Categories**.

The bottom table in Figure 8.12 further breaks down the tabulation by demographic data.

Figure 8.12 Tabulating by Adding Columns as Columns by Categories

		% of Total				
Gender		1	2	3	4	All
boy	Grades	8.16%	12.76%	14.02%	12.55%	47.49%
	Sports	26.57%	12.55%	6.49%	1.88%	47.49%
	Looks	9.21%	15.48%	12.34%	10.46%	47.49%
	Money	3.56%	6.69%	14.64%	22.59%	47.49%
girl	Grades	11.51%	12.97%	13.81%	14.23%	52.51%
	Sports	7.95%	19.67%	16.95%	7.95%	52.51%
	Looks	29.50%	10.88%	8.79%	3.35%	52.51%
	Money	3.56%	9.00%	12.97%	26.99%	52.51%

		% of Total														
		Urban/Rural														
		Rural					Suburban					Urban				
Gender		1	2	3	4	All	1	2	3	4	All	1	2	3	4	All
boy	Grades	2.30%	2.93%	3.56%	5.02%	13.81%	2.72%	5.86%	5.02%	5.02%	18.62%	3.14%	3.97%	5.44%	2.51%	15.06%
	Sports	6.49%	3.97%	2.72%	0.63%	13.81%	11.30%	4.60%	2.30%	0.42%	18.62%	8.79%	3.97%	1.46%	0.84%	15.06%
	Looks	3.14%	4.60%	2.72%	3.35%	13.81%	3.77%	5.86%	5.44%	3.56%	18.62%	2.30%	5.02%	4.18%	3.56%	15.06%
	Money	1.88%	2.30%	4.81%	4.81%	13.81%	0.84%	2.30%	5.86%	9.62%	18.62%	0.84%	2.09%	3.97%	8.16%	15.06%
girl	Grades	4.39%	4.39%	4.39%	4.18%	17.36%	2.51%	3.35%	2.93%	4.18%	12.97%	4.60%	5.23%	6.49%	5.86%	22.18%
	Sports	2.30%	6.69%	5.44%	2.93%	17.36%	1.67%	3.56%	5.65%	2.09%	12.97%	3.97%	9.41%	5.86%	2.93%	22.18%
	Looks	9.62%	3.35%	3.35%	1.05%	17.36%	7.95%	2.93%	1.26%	0.84%	12.97%	11.92%	4.60%	4.18%	1.46%	22.18%
	Money	1.05%	2.93%	4.18%	9.21%	17.36%	0.84%	3.14%	3.14%	5.86%	12.97%	1.67%	2.93%	5.65%	11.92%	22.18%

Clicking and Dragging Items

Each column heading has two zones: the upper and the lower. As you drag each column heading into a zone, the cursor transforms into a rectangle to indicate that you can drop the column heading at that position.

- Dropping in the upper zone places the new items above (before) the items on which the addition is dropped.
- Dropping in the lower zone places the addition below (after) the items on which the addition is dropped.

Each row label has two zones: the left and the right:

- Dropping in the left zone puts the new items to the left (before) of the items dropped on.
- Dropping in the right zone puts them to the right (after) of the items dropped on.

Note: You can drag columns from the Tables panel in the data table onto a Tabulate table instead of using the Tabulate Control Panel.

In a properly created table, all grouping columns are together, all analysis columns are together, and all statistics are together. Thus, JMP will not intersperse a statistics keyword within a list of analysis columns. Neither will it insert an analysis column within a list of grouping columns.

If the items' role is obvious, such as keywords or character columns, when you drag and drop, JMP populates the table automatically with the given items. Otherwise, a popup menu lets you choose the role for the items. Roles included on the popup menu are:

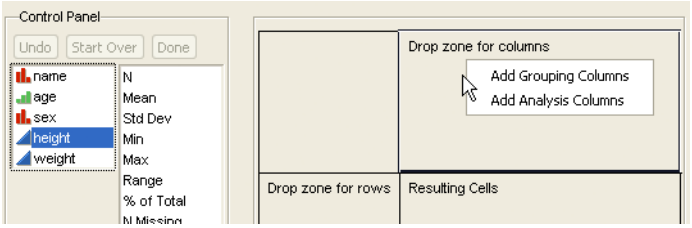
- **Add Grouping Columns** Choose **Add Grouping Columns** if you want to use the variables to categorize the data. For multiple grouping columns, Tabulate will create a hierarchical nesting of the variable.

- **Add Analysis Columns** Choose **Add Analysis Columns** if you want to compute the statistics of these columns.
- **Columns by Categories** Choose **Columns by Categories** if the columns are independent grouping columns (in other words, no hierarchical nesting) sharing a similar set of distinct data values, and you want a crosstabulation of the column by the categories layout.
- **Grouping Columns for Separate Tables** Choose **Grouping Columns for Separate Tables** if you have multiple independent grouping columns and you want to generate separate tables for each grouping column.

Inserting a Grouping Column

To insert a grouping column, click and drag, and then release a column name or statistics keyword into the table. Select **Add Grouping Columns** from the menu that appears, as shown in Figure 8.13. If adding it as a grouping column is the only logical choice, JMP automatically inserts it as a grouping column; the popup menu will not appear.

Figure 8.13 Example of Adding a Grouping Column



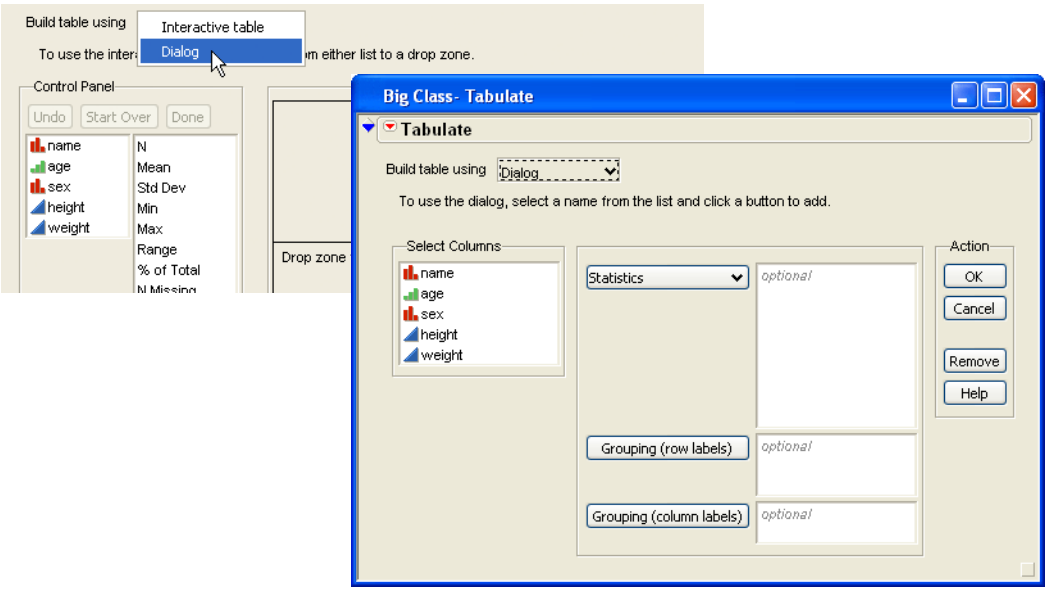
Inserting an Analysis Column

To insert an analysis column, click and drag, and then release a column name or statistics keyword into the table. Select **Add Analysis Columns** from the menu that appears, as shown in Figure 8.13.

Using the Window

If you prefer not to click and drag and build the table interactively, you can create a simple table using the window interface. After selecting **Tables > Tabulate**, select **Dialog** from the drop-down menu beside Build table using, as shown in Figure 8.14. The window is very similar to the Summary window, and the resultant table is like the layout of the summary table. (See "Summarizing Columns," p. 263.) You can change the table generated by the window in the same way that you would with one generated through drag and drop.

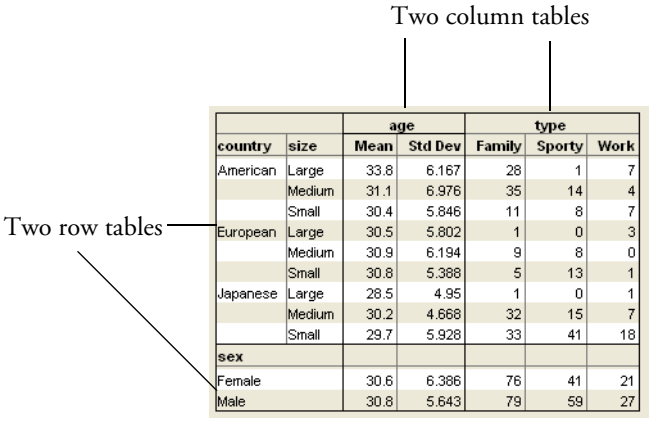
Figure 8.14 Using the Window



Column Tables and Row Tables

The Tabulate platform enables you to build sub-tables within a larger table. These sub-tables are called *row tables* and *column tables*, as illustrated in Figure 8.15 using Car poll.jmp.

Figure 8.15 Row and Column Tables

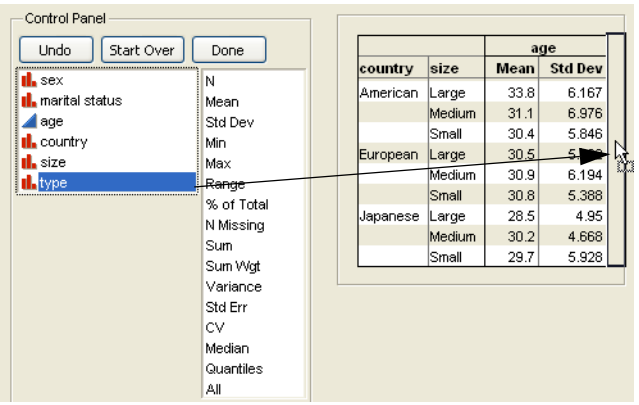


		age		type		
country	size	Mean	Std Dev	Family	Sporty	Work
American	Large	33.8	6.167	28	1	7
	Medium	31.1	6.976	35	14	4
	Small	30.4	5.846	11	8	7
European	Large	30.5	5.802	1	0	3
	Medium	30.9	6.194	9	8	0
	Small	30.8	5.388	5	13	1
Japanese	Large	28.5	4.95	1	0	1
	Medium	30.2	4.668	32	15	7
	Small	29.7	5.928	33	41	18
sex						
Female		30.6	6.386	76	41	21
Male		30.8	5.643	79	59	27

To construct this table, begin with country and size as grouping columns and age as an analysis column. Then, add **Mean** and **Std Dev** as statistics to complete the first column table.

Next, drag type to the right of the age section to add the second column table, as shown in Figure 8.16.

Figure 8.16 Second Column Table



Finally, drag sex below these column tables to add the second row table. You now have Figure 8.15.

Editing Tables in Tabulate

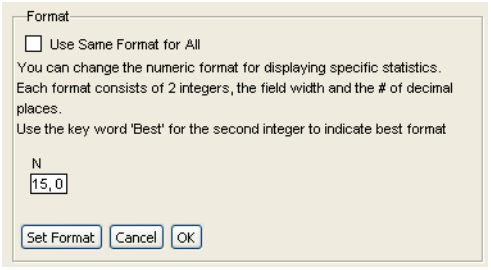
There are several ways to edit the items you add to a table.

Changing Numeric Formats

The formats of each cell depend on the analysis column and the statistics. For counts, the default format has no decimal digits. For each cell defined by some statistics, JMP tries to determine a reasonable format using the format of the analysis column and the statistics requested. To override the default format:

1 Click the **Change Format** button at the bottom of the Tabulate window.
2 In the window that appears (Figure 8.17), enter the field width, a comma, and then the number of decimal places you want displayed in the table. If you would like JMP to determine the best format for you to use, type the word **Best** in the text box. JMP now considers the precision of each cell value and selects the best way to show it.
3 Click OK.

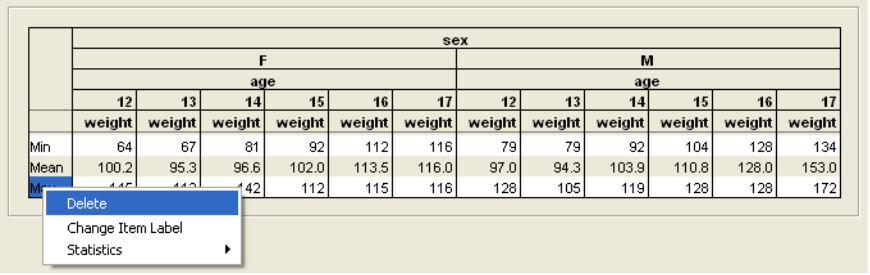
Figure 8.17 Changing Numeric Formats


Format
Use Same Format for All
You can change the numeric format for displaying specific statistics.
Each format consists of 2 integers, the field width and the # of decimal places.
Use the key word 'Best' for the second integer to indicate best format
N
15,0
Set Format
Cancel
OK

Deleting Items

After you add items, you can remove them by clicking the Undo button. You can also select the items, right-click and select **Delete** from the menu that appears (Figure 8.18).

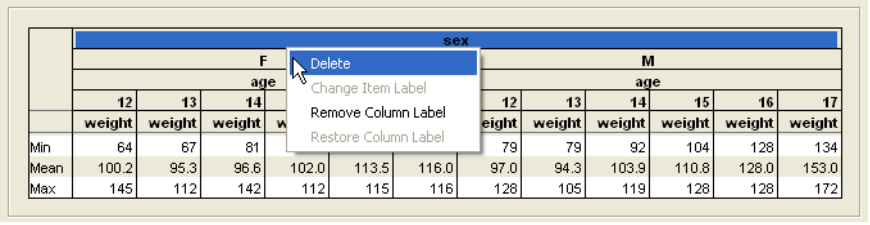
Figure 8.18 Deleting Items



Removing Column Labels

Grouping columns display the column name atop the categories associated with that column. For some columns, the column name might seem redundant. Remove the column name from the column table by right-clicking the column name and selecting **Remove Column Label** (Figure 8.19). To re-insert the column label, right-click on one of its associated categories and select **Restore Column Label**.

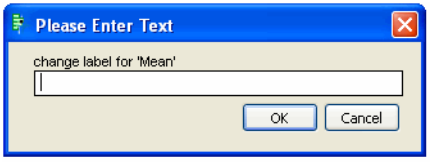
Figure 8.19 Right-click to Display the Menu



Editing Statistical Key Words and Labels

You might want to edit a statistical key word or a variable's label. For example, instead of Mean, you might want to use the word Average. To make edits, right-click the word you want to edit and select **Change Item Label** (Figure 8.19). In the box that appears, type the new label (Figure 8.20). Alternatively, you can type directly into the edit box.

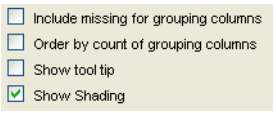
Figure 8.20 Editing Items



Note that if you change one statistics keyword to another statistics keyword, JMP assumes that you actually want to change the statistics, not just the label. It would be as if you have deleted the statistics from the table and added the latter.

Additional Tabulate Options

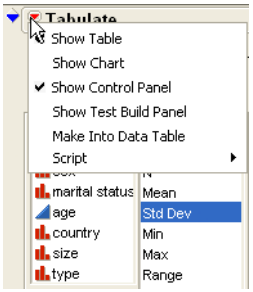
At the bottom of the Tabulate window, check boxes enable you to control tooltips and shading:



- **Include missing for grouping columns** Creates a separate group for missing values in grouping columns. When unchecked, missing values are not included in the table.
- **Order by count of grouping columns** Changes the order of the table to be in ascending order of the grouping columns.
- **Show tool tip** Displays tips that appear when you move the mouse over areas of the table.
- **Show Shading** Displays gray shading boxes in the table when there are multiple rows.

Other options are available by clicking the red triangle icon in the Tabulate window. They are shown in Figure 8.21.

Figure 8.21 The Test Build Panel



- **Show Table** Displays the summarized data in tabular form.
- **Show Chart** Displays the summarized data in bar charts that mirrors the table of summary statistics. The simple bar chart enables visual comparison of the relative magnitude of the summary statistics. By default, all columns of bars share the same scale. You can have each column of bars use the scale determined separately from the data in each displayed column, by clearing the **Uniform plot scale** check box. The chart display also enables you to specify a uniform custom scale. The charts are either 0-based or centered on 0. If the data are all non-negative, or all non-positive, the charts will have its baseline at 0. Otherwise, the charts are centered on 0.
- **Show Control Panel** Displays the control panel for further interaction.
- **Show Test Build Panel** Displays the control area that lets you create a "test build" using only some values from the original table. See "Using Large Amounts of Data (the Test Build Feature)," p. 280, for details.

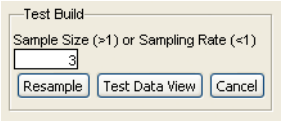
- **Make Into Data Table** Makes a data table from the report. There will be one data table for each row table, since labels of different row tables might not be mapped to the same structure. See "Turning a Report Table Into a Data Table," p. 183, for details.
- **Script** Displays options for saving scripts, redoing analyses, and viewing the data table. See "Saving Your Steps as a Script," p. 179, for details.

Using Large Amounts of Data (the Test Build Feature)

If you have a very large data table, you might want to use a small subset of the data table to try out different table layouts to find one that best shows the summary information. In this case, JMP generates a random subset of the size as specified and uses that subset when it builds the table. To use the test build feature:

1 Click the red triangle icon in the Tabulate title bar.
2 Select **Show Test Build Panel**.
3 Enter the size of the sample you want in the box under **Sample Size (>1) or Sample Rate (<1)**, as shown in Figure 8.22. The size of the sample can be either the proportion of the active table you enter or the number of rows from the active table.

Figure 8.22 The Test Build Panel



4 Click **Resample**.
5 To see the sampled data in a JMP data table, click the **Test Data View** button. When you dismiss the test build panel, Tabulate will use the full data table to regenerate the tables as designed.

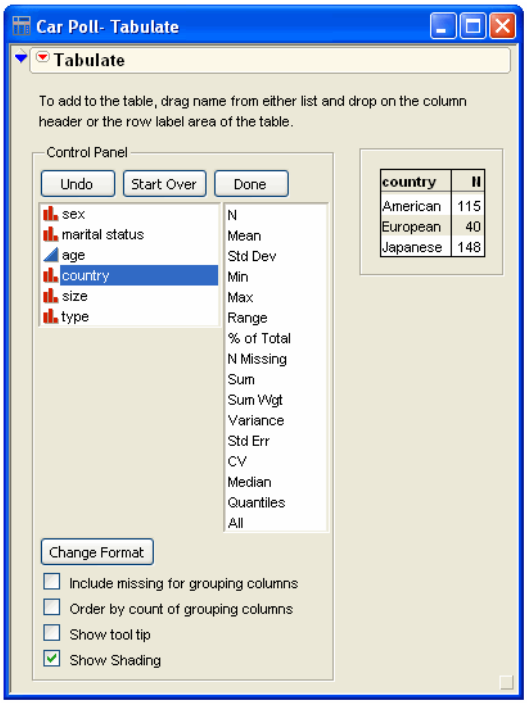
Example of Tabulating Data

Follow along with this next example by opening Carpoll.jmp from the Sample Data folder that was installed when you installed JMP.

Creating a Table of Counts

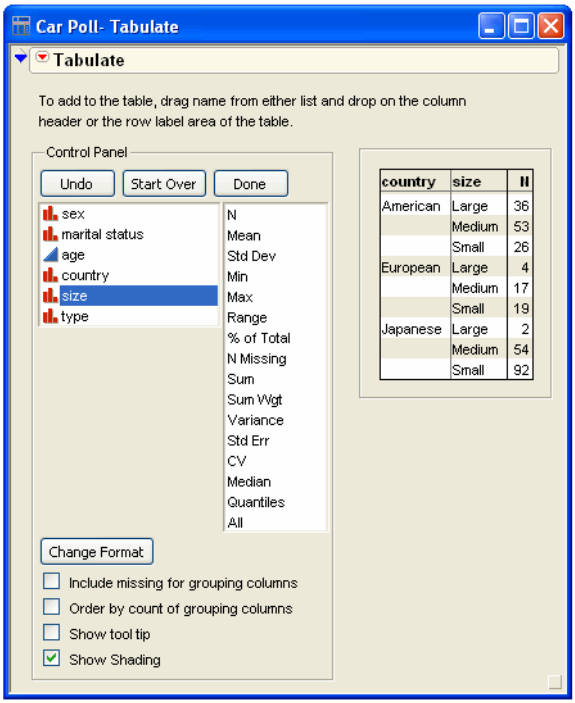
Suppose you would like to view a table that contains counts for how many people in the survey own Japanese, European, and American cars. To create the table, select **Tables > Tabulate**. Then click and drag country into the left column of the table, as shown in Figure 8.23.

Figure 8.23 Adding column to the Table



Now add further statistics and variables to the table. You would like to see a count of people who drive Japanese, European, and American cars broken down by the size of the car. To do this, click size and drag it beside country, as shown in Figure 8.24.

Figure 8.24 Adding Size to the Table



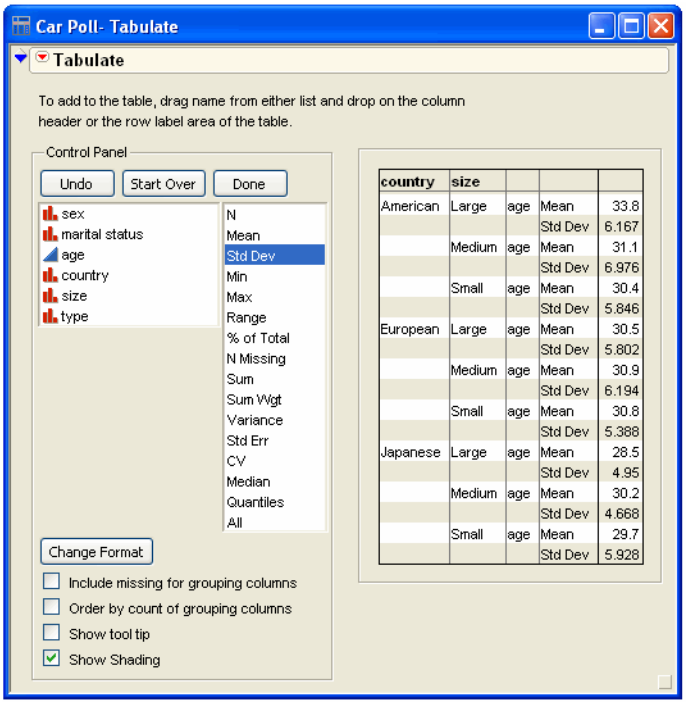
Creating a Table Showing Statistics

Now suppose you would like to see the average and standard deviation of the age of people who own each size car:

1 Click and drag age, placing it to the right of size in the table. Select **Add Analysis Columns** from the menu that appears.
2 Click and drag Mean, placing it over Sum in the table.
3 Click and drag Std Dev, placing it under Mean in the table.

The results are shown in Figure 8.25.

Figure 8.25 Table that Includes the Mean and Standard Deviation of Age

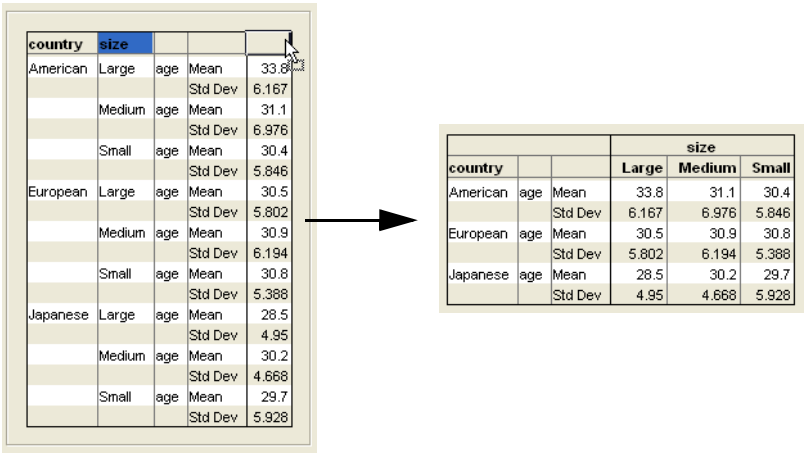


country	size			
American	Large	age	Mean	33.8
			Std Dev	6.167
	Medium	age	Mean	31.1
			Std Dev	6.976
	Small	age	Mean	30.4
			Std Dev	5.846
European	Large	age	Mean	30.5
			Std Dev	5.802
	Medium	age	Mean	30.9
			Std Dev	6.194
	Small	age	Mean	30.8
			Std Dev	5.388
Japanese	Large	age	Mean	28.5
			Std Dev	4.95
	Medium	age	Mean	30.2
			Std Dev	4.668
	Small	age	Mean	29.7
			Std Dev	5.928

Rearranging the Table Contents

Change the view of the data by clicking size and dragging it to the right of the table, as shown in Figure 8.26.

Figure 8.26 Moving size



country	size			
American	Large	age	Mean	33.8
			Std Dev	6.167
	Medium	age	Mean	31.1
			Std Dev	6.976
	Small	age	Mean	30.4
			Std Dev	5.846
European	Large	age	Mean	30.5
			Std Dev	5.802
	Medium	age	Mean	30.9
			Std Dev	6.194
	Small	age	Mean	30.8
			Std Dev	5.388
Japanese	Large	age	Mean	28.5
			Std Dev	4.95
	Medium	age	Mean	30.2
			Std Dev	4.668
	Small	age	Mean	29.7
			Std Dev	5.928

			size		
country			Large	Medium	Small
American	age	Mean	33.8	31.1	30.4
		Std Dev	6.167	6.976	5.846
European	age	Mean	30.5	30.9	30.8
		Std Dev	5.802	6.194	5.388
Japanese	age	Mean	28.5	30.2	29.7
		Std Dev	4.95	4.668	5.928

Now click and drag age, placing it under Large in the table. Click and drag both Mean and Std Dev, placing them under Large in the table. The results are shown in Figure 8.27.

Figure 8.27 The Result of Moving Items

	size					
	Large		Medium		Small	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
country	age	age	age	age	age	age
American	33.8	6.167	31.1	6.976	30.4	5.846
European	30.5	5.802	30.9	6.194	30.8	5.388
Japanese	28.5	4.95	30.2	4.668	29.7	5.928

Now your table clearly presents the data. It is easy to see the mean and standard deviation of car owner age broken down by car size and country.

Chapter 9

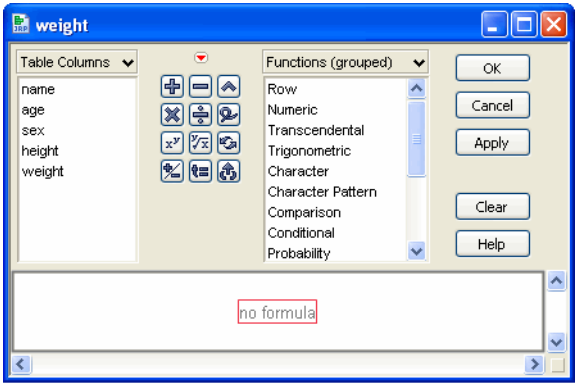
Formula Editor

Constructing a Formula

As described in "Giving Columns a Formula to Compute Values," p. 142, you can create a column whose values are computed by a formula and store that formula as part of a column's information. Formulas can be simple assignments of numeric, character, or row state constants, or they can contain complex evaluations based on conditional clauses. The JMP formula editor provides you these capabilities, and it also enables you to examine or change the formula at any time.

The formula editor window operates like a pocket calculator with buttons, displays, and a list of functions.

Figure 9.1 The Formula Editor



Formulas are an integral part of a data table for the following reasons:

- They are stored as part of a column's information when you save the data table.
- You can examine or change them at any time by opening the formula editor.
- Their values can be linked to, or dependent on, the values in other columns. Their values are automatically recomputed whenever you edit the values in the columns to which the formula is linked.
- Their values are locked in the data table so they cannot be manually edited.

This chapter describes the formula editor and shows how to build formulas. For details about each function, see "Formula Functions Reference," p. 453.

Contents

Creating a Formula 287
Referencing Columns and Table Variables 288
Using Local Variables 289
Referencing Columns and Table Variables 288
Adding Operators 291
Using Functions 294
Referencing Rows 297
Adding Numeric Functions 297
Inserting Logarithmic or Trigonometric Functions 298
Adding Character Arguments and Returning Character Strings 300
Matching Character Patterns 300
Comparing Values 301
Using Conditional Clauses 302
Calculating Quantiles and Probabilities 303
Calculating Discrete Probabilities 304
Computing Statistical Functions 305
Generating Random Numbers 306
Using Dates and Times 306
Processing Row State Data 307
Using Assignment Functions 309
Ordering Expressions in Formulas 310
Using Formula Editor Options 311
Calculating Derivatives 312
Simplifying Complex Formulas 312
Evaluating Formulas 313
Ignoring Errors 314
Viewing a Formula's Values from the Formula Editor 315
Viewing a Formula in JSL 315
Editing Formulas 315
Customizing Formulas 318
Examples and Tutorials 321
Using Keyboard Shortcuts 327
Glossary of Terms 327

Creating a Formula

A formula is an expression stored in a column that performs operations in order to insert values into that column. Formulas can perform mathematical operations, such as addition and multiplication, or they can compare column values or join values by referring to other areas in the same data table. Formulas can consist of any JMP Scripting Language (JSL) command. Once you insert a formula into a column, the column is locked: its values can be edited only by changing or removing the formula.

There are three basic steps to building a formula:

1 Open the formula editor by right-clicking the column name to which you want to apply the formula and selecting **Formula**.

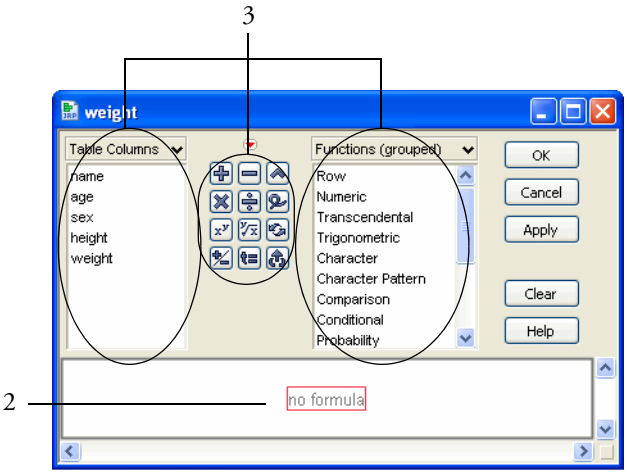
or

Double-click the column name to which you want to apply the formula, select **Formula** from the **Column Properties** menu, and then click **Edit Formula**.

2 Select an empty formula element in the formula editing area by clicking it. (See Figure 9.2.) **Note:** An element is selected when there is a red outline around it. All terms within the smallest nesting box relative to the place you clicked become selected. The subsequent actions apply to those combined elements.

3 Add expressions, functions, and terms from the formula work panel. (See Figure 9.2.) They are applied to the highlighted red box. The following sections in this chapter provide detailed instructions on how to add constants, elements, operators, and functions.

Figure 9.2 Building a Formula



See "Using Basic Formula Editor Features," p. 321, for an example of how to use the formula editor.

Referencing Columns and Table Variables

You can create a formula that refers to values found in other parts of the data table, such as other columns and table variables.

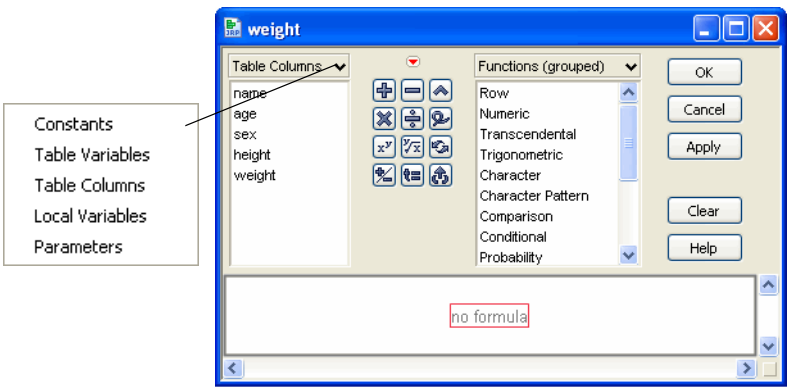
When a formula uses values in other columns, the values in the column with that formula are dependent on the values in those other columns. Whenever a column that the formula refers to changes, the dependent column also changes. If you delete the referenced column, empty terms appear in the column containing the formula.

If you create a formula that refers to values found in table variables, those table variables must already exist in the data table. Table variables are character strings that are available to the entire table. Their names are displayed in the table panel at the left of the data grid. (See "Adding Table Variables," p. 84, for details)

To build a formula that references values found in columns or table variables

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select a box in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the formula element browser and select either **Table Columns** or **Table Variables**, as shown in Figure 9.3. Then highlight an element from that category's list. The element is added to the selected box in the formula editing area.

Figure 9.3 Formula Element Browser



See "Using Basic Formula Editor Features," p. 321, for an example of referencing a column in a formula.

Note: In a formula, when you reference a column using value labels, hover your mouse over the value label to see the actual data value.

Using Local Variables

You can create and use temporary numeric variables in expressions. You can use ordinary local variables or you can use parameters, which are special types of local variables. Local variables exist only for the evaluation of the formula in which they are defined. They appear in formulas as bold italic terms.

Local variables are most often used with **Assignment** functions, which can assign expressions to local variables that are used in a complex equation. (See "Using Assignment Functions," p. 309, for details.) This technique can sometimes simplify building an equation and improve the efficiency of its evaluation.

To build a formula that references values found in local variables

Step 1: Create the Local Variable

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select a box in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the formula element browser and select **Local Variables** from the formula element browser menu.
4 Click **New Local Variable**.
5 Type a name for the local variable. By default, local variables have the names *t0*, *t1*, and so on, and have missing values.
6 Assign a starting value, and click **OK**.
7 (Optional) To copy, edit, or delete a local variable, right-click (Ctrl-click on the Macintosh) its name and select **Copy**, **Edit**, or **Delete**.

Step 2: Insert a Local Variable Into a Formula

1 Select a term in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
2 Click the local variable name in the **Local Variables** list. It appears in the formula as a bold italic term.

Note: Another way to create local variables is to use the button on the formula editor keypad, which automatically creates and displays local variables and places a semicolon after it. See "Adding Operators," p. 291, for details.

See "Using Local Variables in a Formula," p. 323, for an example of referencing local variables in a formula.

Incorporating Parameters

Parameters are special types of local variables that are recognized as model parameters in some platforms, like Nonlinear fitting. They can be used in formulas just as ordinary local variables can.

To view examples of parameters

1 In the Sample Data folder that was installed when you installed JMP, open the Nonlinear Examples folder and then US Population.jmp.

2 Right-click the column name x-formula and select **Formula**.
3 Click the menu on the formula element browser and select **Parameters**.

Notes:

- After completing a nonlinear fit or after using the **Reset** button in the nonlinear control panel, the parameter's value is the most recent value computed by the nonlinear platform.
- When a computing process changes the value of a parameter, the new value then appears in the parameter list.
- When you paste a formula with parameters into a column, the parameters are automatically created for that column unless it has existing parameters with the same names.

To build a formula that references values found in parameters

Step 1: Create the Parameter

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Make sure a term is selected (a red highlight is around it in the formula editing area) in the formula editing area.
3 Click the menu on the formula element browser and select **Parameters**.
4 Click **New Parameter**.
5 Type a name for the parameter. By default, parameters have the names *b0*, *b1*, and so on, and have missing values.
6 Assign a starting value, and click **OK**. It is important to enter this value when using a parameter in a model for the nonlinear platform. After completing a nonlinear fit, the parameter's value is the most recent value computed by the nonlinear platform.
7 (Optional) To copy, edit, or delete a parameter, right-click (Ctrl-click on the Macintosh) its name and select **Copy**, **Edit**, or **Delete**.

Step 2: Insert a Parameter Into a Formula

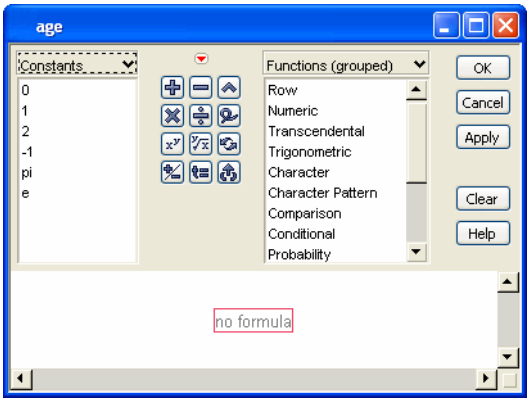
1 Select a term in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
2 Click the parameter name in the **Parameters** list. The parameter appears in the formula as bold type.

Inserting Constants

Formulas can be simple assignments of numeric, character, or row state constants, or they can contain complex evaluations based on conditional clauses. Constants include commonly used numeric terms, such as e, pi, -1, 0, 1, and 2. There are two ways to add a constant value to a formula:

- Type them in manually using the keyboard
- Select them from the formula element browser, as shown in Figure 9.4.

Figure 9.4 The Formula Element Browser with Constants Selected



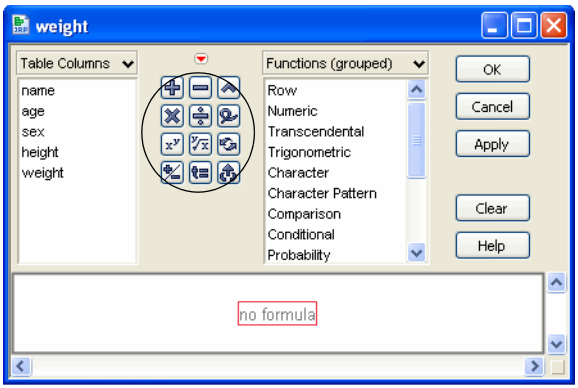
To add constants to a formula

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select a box in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Either type in a number or click the menu at the top of the formula element browser and select **Constants**, as shown in Figure 9.4. Then click a value in the list that appears: **0**, **1**, **2**, **-1**, **pi**, **e**. The value appears in the outlined box.
4 Complete the remainder of the formula using the keypad and functions. (See "Referencing Columns and Table Variables," p. 288, "Adding Operators," p. 291, and "Using Functions," p. 294.)

Adding Operators

You can add operators to a formula by clicking the keypad (shown in Figure 9.5), which is a set of buttons used to help build formulas. It includes common operators, which are also referred to as functions.

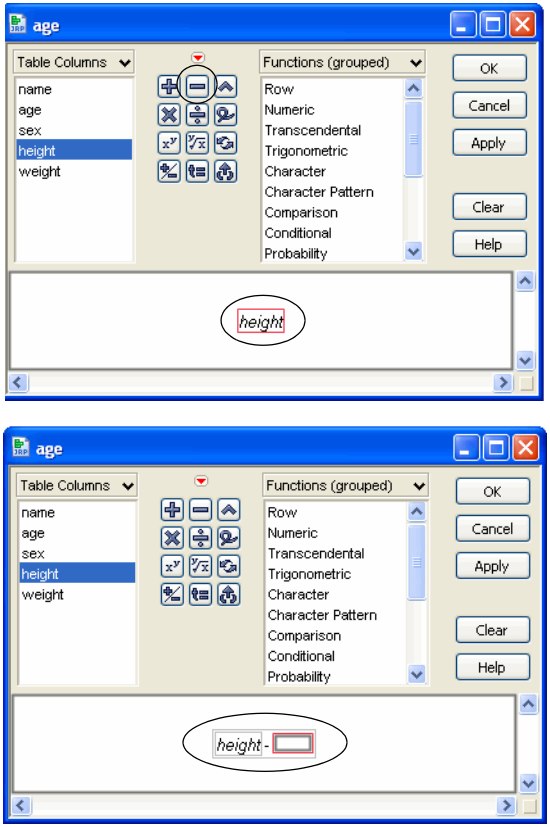
Figure 9.5 The Keypad



To build a formula using operators found on the on-screen keypad

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select a box in the formula editing area by clicking it. (It is selected when there is a red outline around it.) The operator performs its action on the area that is highlighted.
3 Click the keypad button(s). Table 9.1 shows an example of using the keypad.

Table 9.1 Adding a Subtraction Operation to a Formula

Click the minus key on the keypad to add a subtraction operation.	

Keypad Reference

Table 9.2 describes the on-screen keypad buttons.

Table 9.2 Keypad Buttons in the Formula Editor

Key	Name	Description
	Arithmetic buttons	Work as they normally do on a pocket calculator, providing addition, multiplication, subtraction, and division operators.
	Insert	Inserts a new clause or function argument. First select the existing clause or argument you want the new element to follow, and then click this button. The new clause appears and is selected. You can also insert a new clause or argument by typing a comma.
	Delete	Deletes an element's value, or deletes a clause. The delete button functions the same as the Delete key on the keyboard.

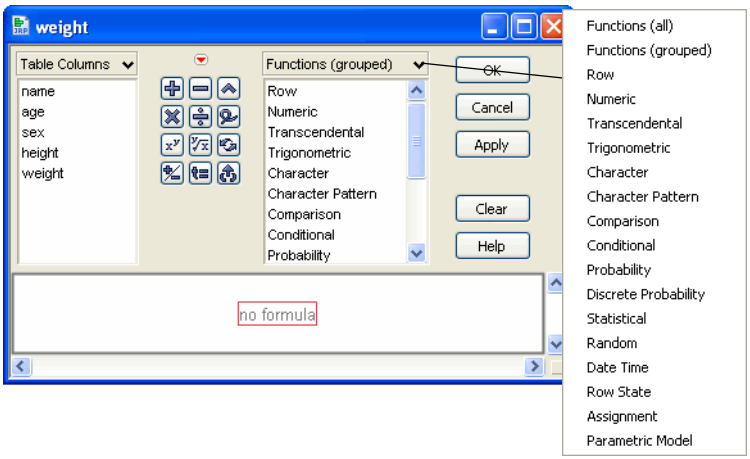
Table 9.2 Keypad Buttons in the Formula Editor *(Continued)*

Key	Name	Description
	Exponent	Raises a given value to a specified power. It has an exponent of two by default. The power is initially highlighted and can be changed to another value.
	Root	Calculates the specified root of the radicand. It has an implied index of two (a square root), which is not displayed. The index area is initially highlighted so you can enter a different index value.
	Switch terms	Looks at the operator that is central to the selected expression and switches the expressions on either side of that operator.
	Unary sign function	Inverts the sign of the argument. Apply the unary sign function to variable expressions or use it to enter negative constants.
	Local variable	Creates and displays a local variable and assigns it the value of the selected expression. The local variable has the default name *t0* in an expression and a semicolon after it. See "Using Local Variables," p. 289, for details about creating and inserting local variables. See "Using Local Variables in a Formula," p. 323, for an example.
	Delete expression (peel)	Replaces the outermost expression with the first argument. You can repeat this process to delete a formula term by term. See "Using the Delete Expression Key," p. 326, for an example.

Using Functions

You can add many types of functions to a formula. All of these functions are organized in the function browser. The browser groups collections of functions in lists organized both alphabetically (**Functions (all)**) and by topic (**Functions (grouped)**), as shown in Figure 9.6. Use the function browser to specify the type of calculation you want to perform on the elements in a formula.

Figure 9.6 The Function Browser



To create a formula that contains a function

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.) The function performs its action on the area that is highlighted.
3 Click the menu in the function browser to view the groups of functions.
4 Select a group of functions to view. (See Table 9.3 for details.) The functions that belong to that group are then displayed in the list below the menu. The function groups are briefly described in the following list. For a full description, see the following sections, starting with "Referencing Rows," p. 297.
5 Click any function in the **Functions** list to apply it to the selected item. When you click some items, you reveal a submenu from which you should make a selection.

Note: Most formulas give hints about appropriate arguments through gray words inserted in the boxes in the formula editing area. Formulas also show a small caret in the argument area if additional arguments can be added.

---

6 Continue to build the formula by highlighting terms and clicking items in the formula element browser, keypad, or function browser.

Table 9.3 Groups of Functions

Group	Functions Included
Functions (all)	Displays a list of all available functions in alphabetical order.
Functions (grouped)	Displays a list of all available functions grouped according to topic.
Row	Displays a list of functions that contains miscellaneous functions such as **Lag**, **Dif**, **Subscript**, **Row**, and **NRow**. See "Referencing Rows," p. 297, for details.
Numeric	Displays a list of functions that are terms commonly used in formulas. See "Adding Numeric Functions," p. 297, for details.
Transcendental	Displays a list of functions that are functions such as natural log, common log, exponential, root, factorial, combinatorial, beta, and gamma. See "Inserting Logarithmic or Trigonometric Functions," p. 298, for details.
Trigonometric	Displays a list of functions that are the standard trigonometric functions: sine, cosine, tangent, inverse functions, and hyperbolic functions. See "Inserting Logarithmic or Trigonometric Functions," p. 298, for details.
Character	Displays a list of functions that operate on character arguments such as trimming, finding the length of a string, converting between numbers and characters. See "Adding Character Arguments and Returning Character Strings," p. 300, for details.
Character Pattern	Displays a list of functions that match strings using character patterns and regular expressions. See "Matching Character Patterns," p. 300, for details.

Table 9.3 Groups of Functions *(Continued)*

Group	Functions Included
Comparison	Displays a list of functions that are the standard logical comparisons such as less than, less than or equal to, not equal to, and so forth. See "Comparing Values," p. 301, for details.
Conditional	Displays a list of functions that are programming-like functions, such as **If**, **Match**, and **Select**. See "Using Conditional Clauses," p. 302, for details.
Probability	Displays a list of functions that compute probabilities and quantiles for standard statistical distributions, such as normal, Student's *t*, Chi-squared, and *F*-distributions. See "Calculating Quantiles and Probabilities," p. 303, for details.
Discrete Probability	Displays a list of functions that compute discrete probabilities, such as Poisson, Gamma Poisson, and Hypergeometric. See "Calculating Discrete Probabilities," p. 304, for details.
Statistical	Displays a list of functions that calculate standard statistical quantities such as the mean or standard deviation. See "Computing Statistical Functions," p. 305, for details.
Random	Displays a list of functions that generate random numbers based on predefined distributions such as the uniform, normal, Cauchy, and so on. There is also a function to randomize the order of table rows. See "Generating Random Numbers," p. 306, for details.
Date Time	Displays a list of functions that require arguments with the *date* data type, which is interpreted as the number of seconds since January 1, 1904. **Date Time** functions return values such as day, week, or month of the year. They can also compute dates and can find data intervals. See "Using Dates and Times," p. 306, for details.
Row State	Displays a list of functions that assign or detect row state status of color, marker, label, hidden, excluded, or selected. See "Processing Row State Data," p. 307, for details.
Assignment	Displays a list of functions that place the value on the right side of the assignment operator into the variable on the left side of the operator. See "Using Assignment Functions," p. 309, for details.
Parametric Model	Lets you construct a **Linear**, **Interactions**, or **Full Quadratic** model for columns that you choose. After choosing the type of model, a window appears that lets you select the variables from which to construct the model. Hold the CTRL key and Click to select more than one.

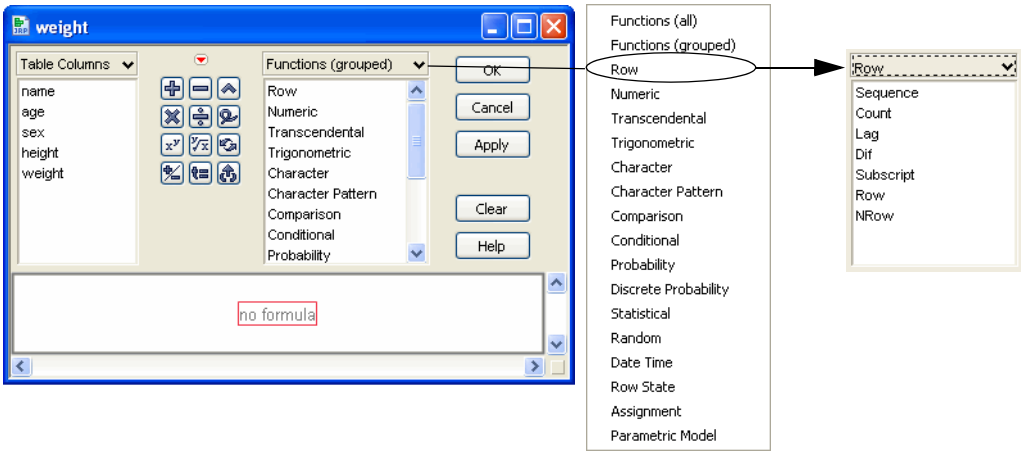
Referencing Rows

Adding a row function to a formula lets you reference specific rows or cells within specific rows. It lets you insert miscellaneous functions such as **Lag**, **Dif**, **Subscript**, **Row**, and **NRow**.

To reference rows

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Row**, as shown in Figure 9.7. The row functions now appear in the list below the menu.

Figure 9.7 Select Row From the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Row Functions," p. 455.

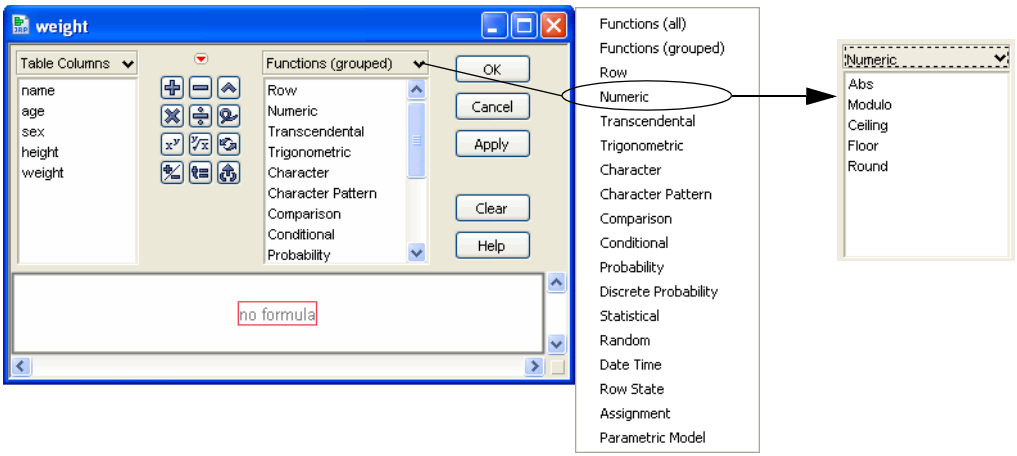
Adding Numeric Functions

You can create a formula that contains arithmetic operators that are commonly used in formulas, such as absolute value, modulo, and floor.

To add such numeric terms to a formula

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Numeric,** as shown in Figure 9.8. The numeric functions now appear in the list below the menu.

Figure 9.8 Select Numeric from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Numeric Functions," p. 457.

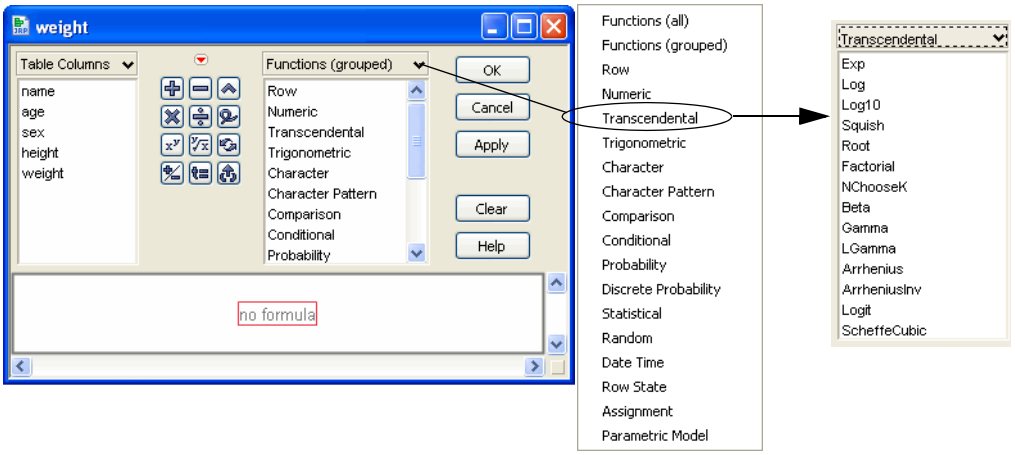
Inserting Logarithmic or Trigonometric Functions

You can create a formula that supports transcendental functions, such as logarithmic functions for any base, functions for combinatorial calculations, the **Beta** function, and several gamma functions.

To add transcendental functions

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Transcendental,** as shown in Figure 9.9. The transcendental functions now appear in the list below the menu.

Figure 9.9 Select Transcendental from the Function Browser List



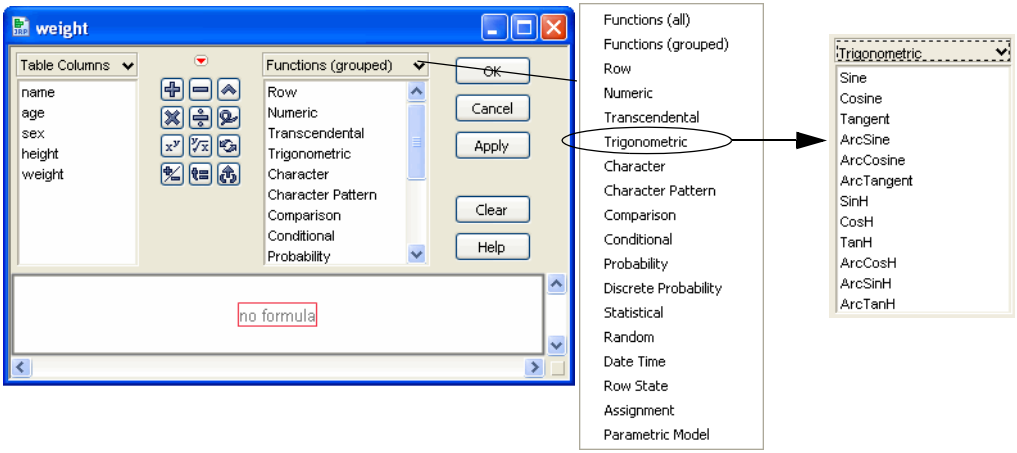
4 Select which function to insert in the formula. For descriptions of each function, see "Transcendental Functions," p. 457.

JMP also supports most trigonometric functions.

To create a formula that uses trigonometric functions

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Trigonometric**, as shown in Figure 9.10. The trigonometric functions now appear in the list below the menu.

Figure 9.10 Select Trigonometric from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Trigonometric Functions," p. 459.

Adding Character Arguments and Returning Character Strings

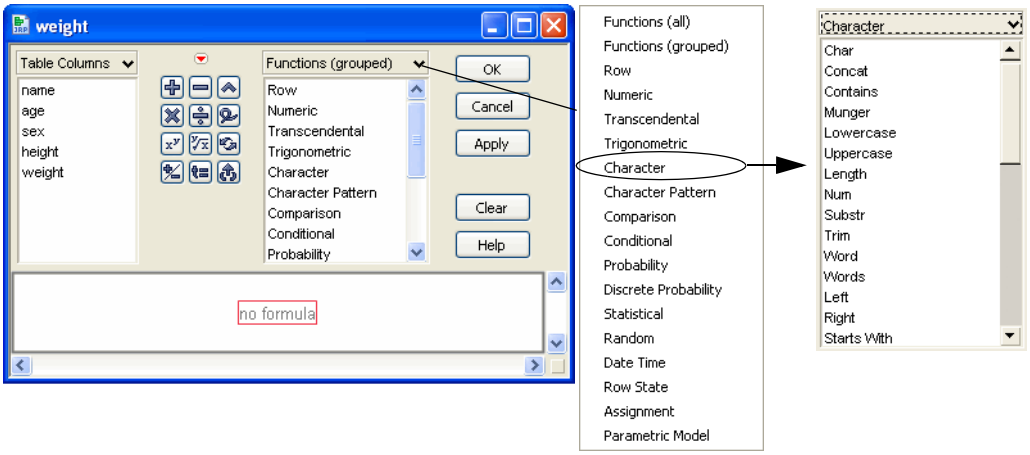
You can create a formula that accepts character arguments or returns character strings and converts the data type of a value from numeric to character, or character to numeric. When you create these formulas, note that:

- Character functions can result in either character or numeric data. If you calculate a data type different from the one specified, the data type of the computed column is automatically changed to match the result.
- Arguments that are literal character strings must be enclosed in quotation marks.

To build a formula that contains a character function or returns character strings

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Character**, as shown in Figure 9.11. The character functions now appear in the list below the menu.

Figure 9.11 Select Character from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Character Functions," p. 460.

See "Using the Munger Function," p. 324, for an example.

Matching Character Patterns

You can create a formula that uses pattern-matching on character strings. Pattern matching is a flexible method for searching and manipulating strings, and regular expressions are also supported. When you create these formulas, note that:

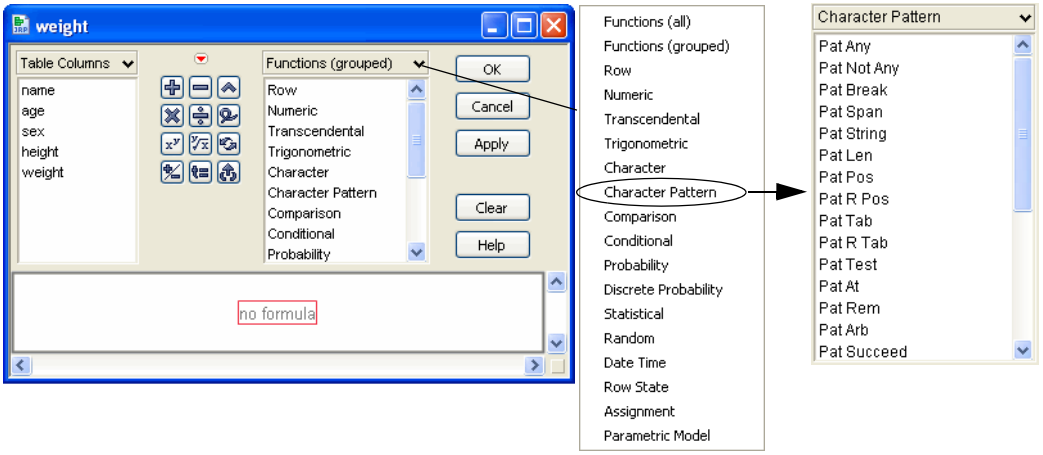
- First, you define a pattern with one more of the character patterns.
- Then, you use **Pat Match** to compare a string to the pattern.

- **Pat Match** returns True (1) if the pattern is found in the string, or it returns False (0) if the pattern was not found in the string.
- To use regular expressions instead of patterns, use **Regex Match**.

To build a formula that contains a character pattern

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Character Pattern**, as shown in Figure 9.12. The character pattern functions now appear in the list below the menu.

Figure 9.12 Select Character Pattern



4 Select which function to insert in the formula. For descriptions of each function, see "Character Pattern Functions," p. 465.

Comparing Values

You can create a formula that compares the values of two arguments. You do this by using the comparison function. Each comparison relationship evaluates as *true* or *false* based on numeric magnitudes or character rankings. A true relationship evaluates as 1, and false evaluates as 0.

Comparisons are useful when you include them in conditional expressions, but they can also stand alone as numeric expressions if neither term in comparison is missing.

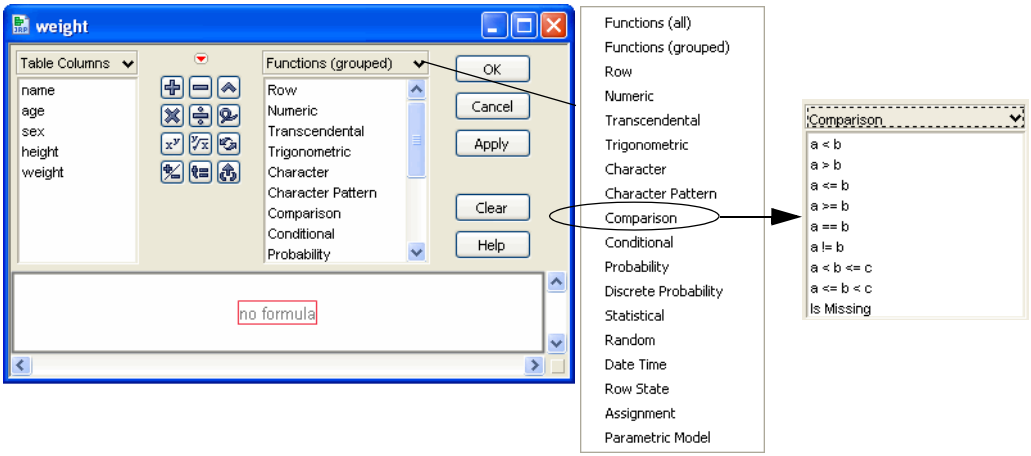
A relational symbol's arguments can be any two expressions. However, both arguments in a comparison function must be of the same data type. Also note that:

- JMP displays an error if you use a single "=" in a conditional where "==" is expected.
- The formula editor uses the International Utilities package when comparing character strings. This package contains different rankings for each international character set and takes diacritical marks into consideration.
- You should not use comparison operators to specifically compare to a missing value. Instead, use the **Is Missing** function to detect a missing value. (See "Comparing Values," p. 301.)

To build a formula that contains a comparison function

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Comparison**, as shown in Figure 9.13. The comparison functions now appear in the list below the menu.

Figure 9.13 Select Comparison from the Functions (grouped) List



4 Select which function to insert in the formula. For descriptions of each function, see "Comparison Functions," p. 467.
5 Enter values in the boxes that represent *a* and *b*.

Using Conditional Clauses

You can include conditional expressions (called *conditionals* for short) in your formulas. These expressions let you build a sequence of clauses paired with result expressions. Constructing a sequence of clauses is the way you conditionally assign values to cells in a calculated column. Conditionals follow these rules:

- When no clause is true, the formula editor evaluates the result expression that accompanies the else clause.
- All result expressions in a conditional expression must evaluate to the same data type.
- A missing term matches any data type.
- By definition, expressions that evaluate as zero are false.
- If an expression evaluates as missing, no clauses are executed and missing is returned. All other numeric expressions are true.

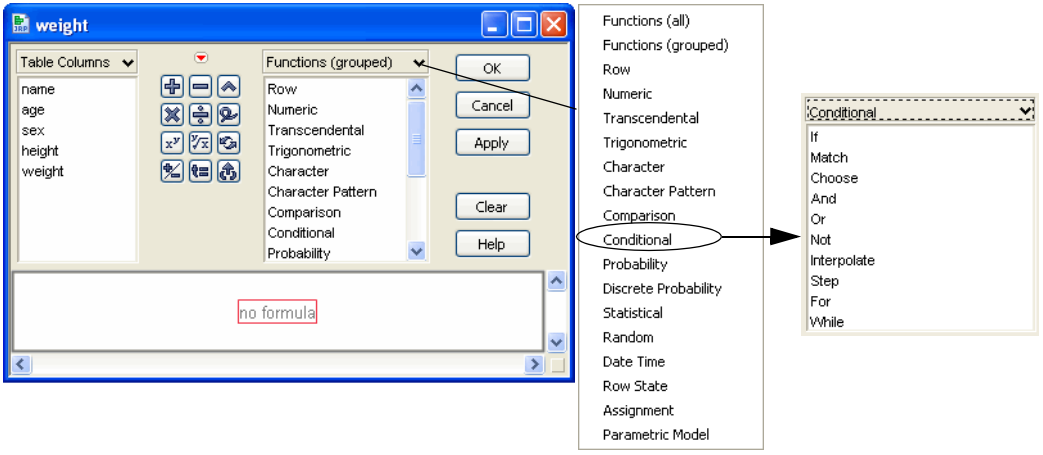
To build a formula that contains conditional clauses

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red

outline around it.)

3 Click the menu on the function browser and select **Conditional**, as shown in Figure 9.14. The conditional functions now appear in the list below the menu.

Figure 9.14 Select Conditional from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Conditional Functions," p. 468.

See "Using the Match Conditional Function," p. 325, for an example.

Calculating Quantiles and Probabilities

You can create a formula that calculates quantiles for various standard statistical distributions and probabilities.

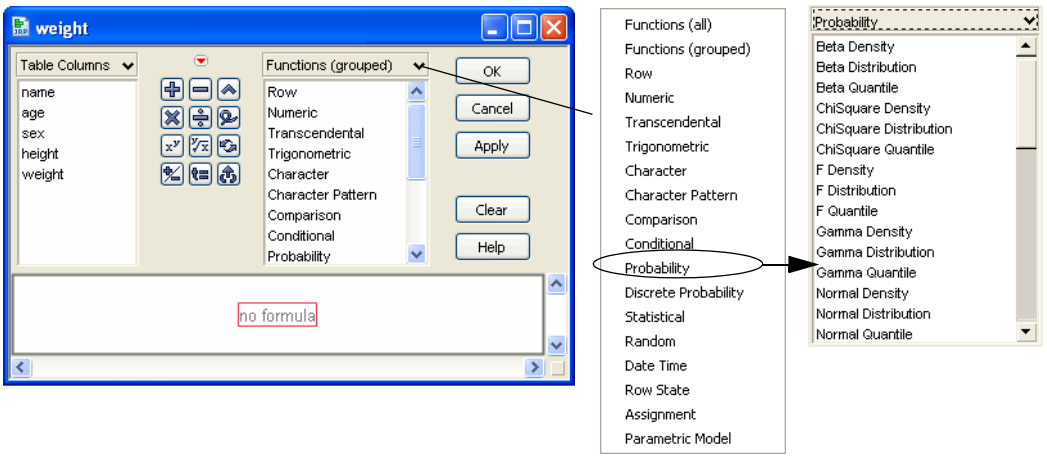
To calculate quantiles and probabilities

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.

2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)

3 Click the menu on the function browser and select **Probability,** as shown in Figure 9.15. The probability functions appear in the list below the menu.

Figure 9.15 Select Probability



4 Select which function to insert in the formula. For descriptions of each function, see "Probability Functions," p. 472.

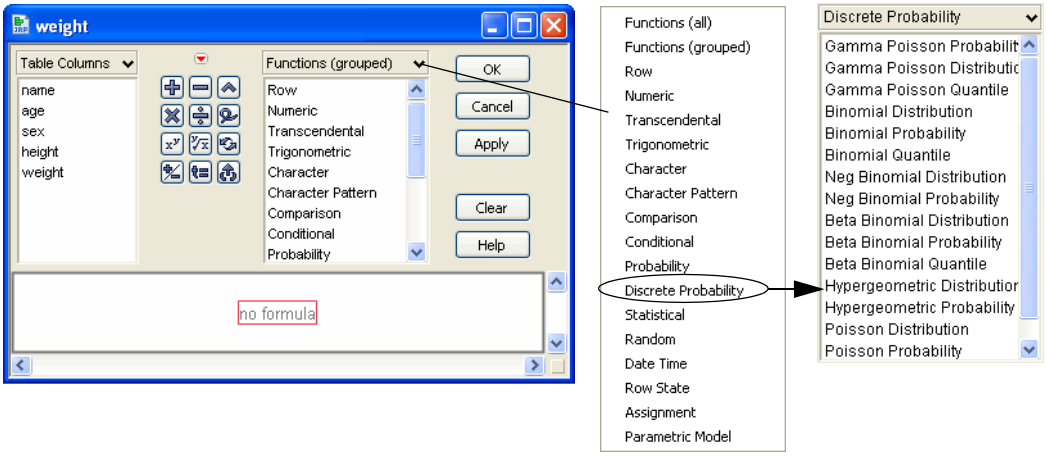
Calculating Discrete Probabilities

You can create a formula that calculates quantiles for various discrete probabilities.

To calculate discrete probabilities

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Discrete Probability,** as shown in Figure 9.15. The probability functions appear in the list below the menu.

Figure 9.16 Select Discrete Probability



4 Select which function to insert in the formula. For descriptions of each function, see "Probability Functions," p. 472.

Computing Statistical Functions

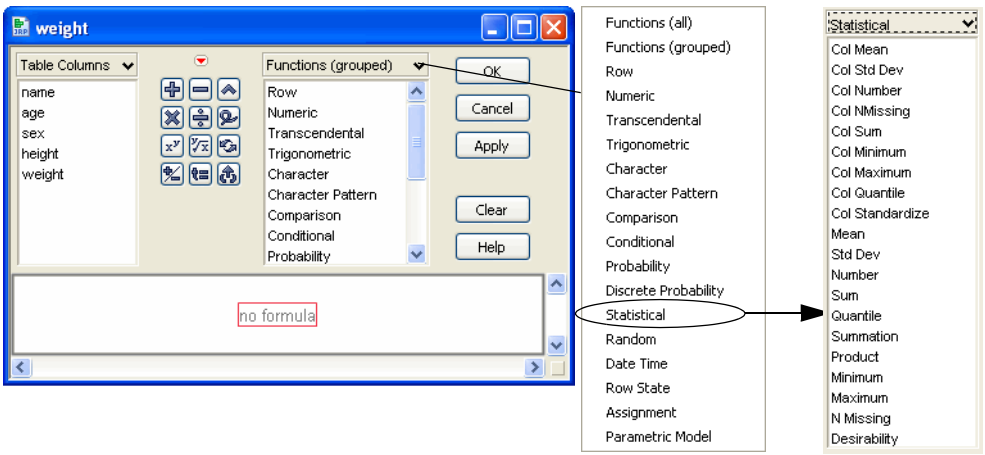
There are two types of **Statistical** functions you can use in a formula:

- The functions with names that have the prefix **Col**. These functions compute statistics for a column of numbers or expressions involving columns.
- The **Mean**, **Std Dev**, **Number**, **Sum**, **Quantile**, **Maximum**, **Minimum**, and **N Missing** functions. These functions evaluate across columns or arguments. The statistic is computed for each row across the series of arguments. You can use the insert key ( ) on the on-screen keypad, or type a comma to add arguments to the functions that accept multiple arguments. When there are multiple contiguous arguments, select the function and the first argument, and then Shift-click the last argument in the group. These functions then automatically show with the complete list.

To create a formula containing a statistical function

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Statistical,** as shown in Figure 9.17. The statistical functions now appear in the list below the menu.

Figure 9.17 Select Statistical from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Statistical Functions," p. 481.

Generating Random Numbers

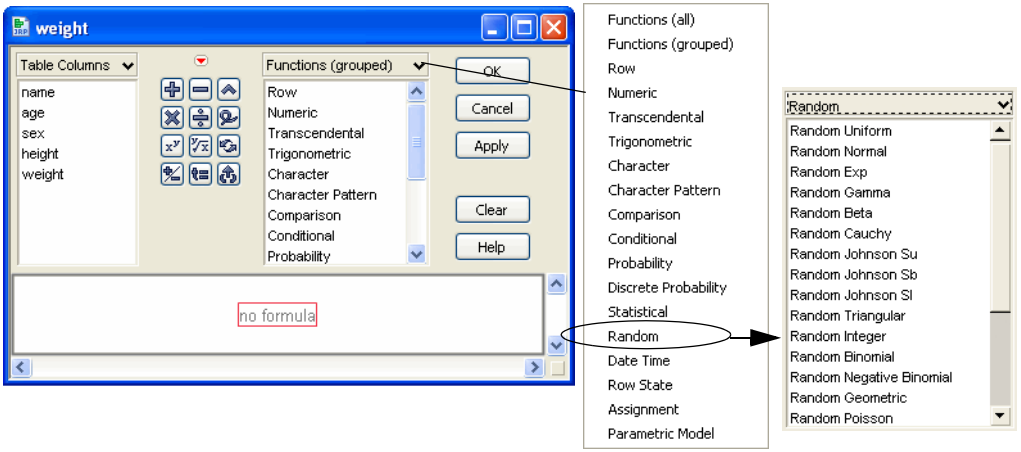
You can create formulas that generate real numbers by effectively "rolling the dice" within the constraints of a specified distribution. Each time you click **Apply** in the formula editor window, these functions produce a new set of random numbers.

Note: Random numbers are generated using the Mersenne-Twister technique. This technique has a period length of 2^{19937}-1. For details about the generators, see Matsumoto and Nishimura (1998). The new generators are verified to pass all the DIEHARD tests as documented in Marshalled (1996).

To create a formula containing a random number

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Random,** as shown in Figure 9.18. The random functions now appear in the list below the menu.

Figure 9.18 Select **Random** from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Random Functions," p. 485.

Using Dates and Times

JMP stores dates and times in numeric columns using the Macintosh standard of the *number of seconds since January 1, 1904*. When a column has date values, you can assign a date format to that column by double-clicking a column name and selecting **Date** or **Time** from the **Format** menu. See "Numeric Format Options," p. 63, for details.

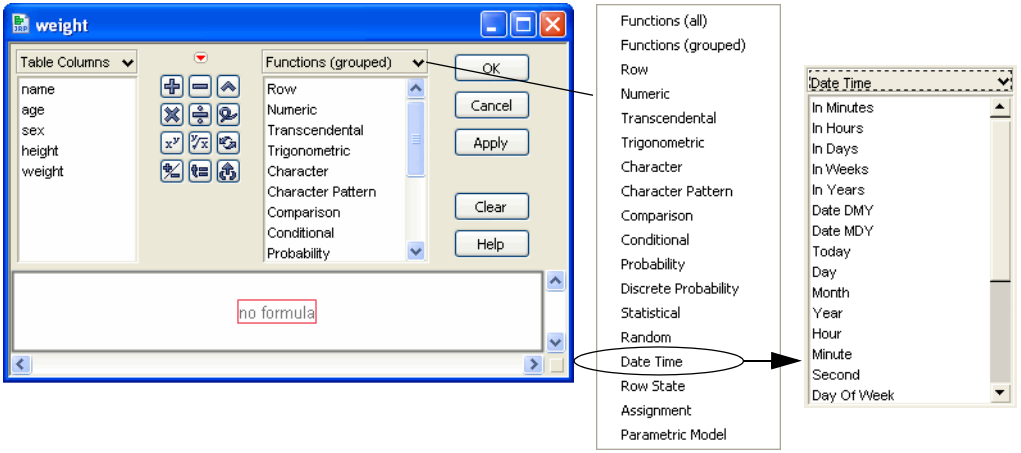
To use dates and times in a formula:

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red

outline around it.)

3 Click the menu on the function browser and select **Date Time,** as shown in Figure 9.19. The date and time functions now appear in the list below the menu.

Figure 9.19 Select **Date Time** from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Date Time Functions," p. 488.

Processing Row State Data

There are six characteristics that rows in a data table can have: selected, hidden, excluded, labeled, colored, and marked. If you give rows one or more of these characteristics and then create row state data table columns, you can then create a formula that computes and saves row state conditions. (See "Assigning Characteristics to Rows and Columns," p. 131, and "Using Row State Columns," p. 165, for details.) This formula processes row state data just as it would process character and numeric data.

Note: A row can be assigned any combination of row states; a row state column can have multiple row states as a value.

Table 9.4 describes the type of argument each Row State function requires and what each returns.

Table 9.4 Row State Functions

Function Name	Argument Type Required	What the Function Returns (Your Column Data Type Should be This Type)
Row State	none	row state of current row
As Row State	numeric	all row states of current row
Combine States	multiple row state arguments	multiple row state assignments
Excluded State	positive integer or zero	row state-excluded or not excluded
Hidden State	positive integer or zero	row state-hidden or not hidden
Labeled State	positive integer or zero	row state-labeled or not labeled

Table 9.4 Row State Functions *(Continued)*

Function Name	Argument Type Required	What the Function Returns (Your Column Data Type Should be This Type)
Color State	integer or color name or {*red*, *green*, *blue*}	row state color
Marker State	integer or character	row state marker
Selected State	positive integer or zero	row state-selected or not selected
Hue State	integer	row state hue
Shade State	integer 1-5	row state intensity
Excluded	**Row State()** or row state column	numeric 0 (not excluded) or 1 (excluded)
Hidden	**Row State()** or row state column	integer 0 (not hidden) or 1 (hidden)
Labeled	**Row State()** or row state column	integer 0 (not labeled) or 1 (labeled)
Color Of	**Row State()** or row state column	color map integer
Marker Of	**Row State()** or row state column	marker map integer
Selected	**Row State()** or row state column	integer 0 (not selected) or 1 (selected)

To process and store row state data using a formula

1 Make sure rows in your data table have at least one characteristic. (See "Assigning Characteristics to Rows and Columns," p. 131.)

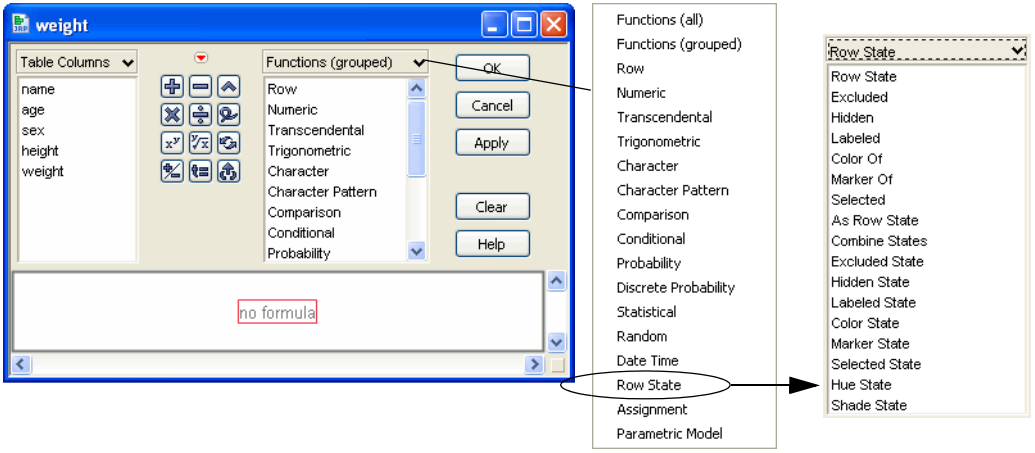
2 Make sure your columns have the correct data type. Use the table above to determine which data type (row state, numeric, or integer) to assign columns. To create row state data table columns, see "Using Row State Columns," p. 165. To create numeric and integer columns, see "About Data Types," p. 58, and "How to Assign Data and Modeling Types," p. 59.

3 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.

4 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)

5 Click the menu on the function browser and select **Row State,** as shown in Figure 9.20. The row state functions now appear in the list below the menu.

Figure 9.20 Select Row State from the Function Browser List



6 Use the table above to help select which function to insert in the formula. For descriptions of each function, see "Row State Functions," p. 489.

Using Assignment Functions

Assignment functions work in place. That is, the result returned by the operation (on the right of the operator) is stored in the argument on the left of the operator and replaces its current value.

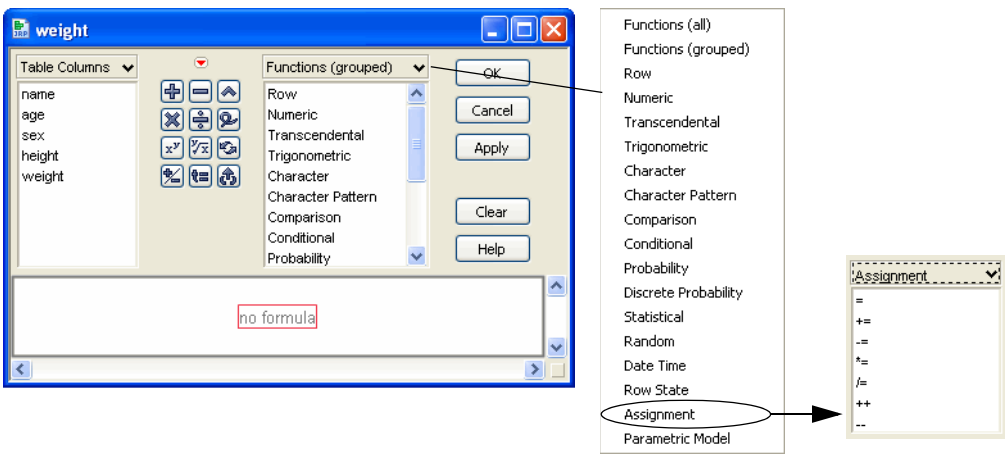
Assignment statements are most often used in conjunction with other commands to build a JMP Scripting Language (JSL) script. You can use the formula editor to create and execute a script in that column, but this is not recommended because of dependencies and ambiguities that can result. Most often, scripts are stored as .jsl files, and can be saved with a data table. See "Creating Scripts," p. 87, for details. See the *JMP Scripting Guide* for documentation of all scripting commands.

Note: The first argument of an **assignment** function must be capable of being assigned. This means you cannot have an assignment such as 3+=4, because 3 is a constant value that cannot be reassigned. You must first create a variable (a table variable or local variable) whose value is 3. (See "Adding Table Variables," p. 84, for details about table variables. See "Referencing Columns and Table Variables," p. 288, for details about local variables). Then use that variable as the left-hand argument of the assignment function.

To build a formula that contains an assignment function

1 Open the formula editor by right-clicking a column name in the data grid and selecting **Formula**.
2 Select an expression in the formula editing area by clicking it. (It is selected when there is a red outline around it.)
3 Click the menu on the function browser and select **Assignment,** as shown in Figure 9.21. The assignment functions now appear in the list below the menu.

Figure 9.21 Select **Assignment** from the Function Browser List



4 Select which function to insert in the formula. For descriptions of each function, see "Assignment Functions," p. 493.

Ordering Expressions in Formulas

As you build a formula, keep in mind that all functions have an order of precedence shown in the following table, where level one is the highest order of precedence. Expressions with a high order of precedence are evaluated before those at lower levels. When an expression has operators of equal precedence, it is evaluated from left to right. You can use parentheses to override other precedence rules when necessary because any expression within parentheses is always evaluated first. Terms have no order of precedence because they cannot be evaluated further. Table 9.5 shows the first six levels of the order of precedence.

Table 9.5 Order of Precedence of Operators in Formulas

Level 1	Parentheses
Level 2	Functions in the function browser lists, **And**, **Or**, **Not**
Level 3	*, ÷, **Modulo**
Level 4	+, –
Level 5	Comparisons: <, ≤, =, ≠, ≥, >, ≤ *x* <, < *x* ≤, < *x* <
Level 6	Logical Operators **&**, **|**, **!**

Note: When a function has an expression as its argument, the argument has a higher order of precedence than it would if enclosed in parentheses outside the function.

Building a Formula in Order of Precedence

It is best to build a formula starting with any expression that serves as an argument. This is because functions have a high order of precedence and are always grouped with their corresponding arguments. It is also a good idea to create expressions working from highest to lowest order of precedence when possible. If you need parentheses, be sure to type the open parenthesis before entering the expression to be enclosed.

For example, given a data table with the columns A, B, and C, use the following steps to compose the expression $A(B + C)$. Note that this expression is not the same as $A \times B + C$, which evaluates as $(A \times B) + C$.

To enter the expression

1 Select **Table Columns** from the formula element browser list.

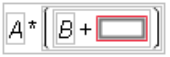
2 Click column A in the **Table Columns** list.

3 Click the multiplication button (✖) in the formula editor keypad.

4 Type an open parenthesis: (.

5 Click column B in the **Table Columns** list.

6 Click the addition button ( ) in the formula editor keypad.



7 Click column C in the **Table Columns** list.

Because the order of precedence determines which arguments are affected by each functions, it also affects the grouping of expressions. Select functions in the formula to verify how the order-of-precedence rules have been applied.

Structuring Formulas for Efficient Evaluation

Usually, it is not necessary to structure formulas with efficient evaluation in mind. Most formulas evaluate almost instantaneously regardless of their structure. This is because statistical functions and constant expressions are evaluated only once when a column's values are calculated.

However, when you are creating conditional expressions, keep in mind that **Match** evaluates faster and uses less memory than an equivalent **Condition** function, **If**. (Note that **Match** ignores trailing spaces, while **If** does not.)

Consider two formulas for predicting a child's height from his age shown in Figure 9.22. In each case there is a base height of 58.125 inches to which a quantity is added depending on the value of the age variable.

Figure 9.22 The Match Conditional Evaluates Faster Than the If Function

$$58.125+\text{Match}(age)\begin{bmatrix}12 & \Rightarrow 0\\ 13 & \Rightarrow 2.16071428571425\\ 14 & \Rightarrow 6.04166666666666\\ 15 & \Rightarrow 6.44642857142854\\ 16 & \Rightarrow 6.20833333333332\\ 17 & \Rightarrow 8.54166666666665\\ \text{else} & \Rightarrow .\end{bmatrix}$$

$$58.125+\text{If}\begin{bmatrix}age==12 & \Rightarrow 0\\ age==13 & \Rightarrow 2.16071428571425\\ age==14 & \Rightarrow 6.04166666666666\\ age==15 & \Rightarrow 6.44642857142854\\ age==16 & \Rightarrow 6.20833333333333\\ age==17 & \Rightarrow 8.54166666666665\\ \text{else} & \Rightarrow \text{else clause}\end{bmatrix}$$

The **Match** conditional evaluates faster than the **If** function because the **age** variable is evaluated only once for each row in the data table. The **If** condition must evaluate the age variable at each **If** clause for each row until a clause evaluates as true.

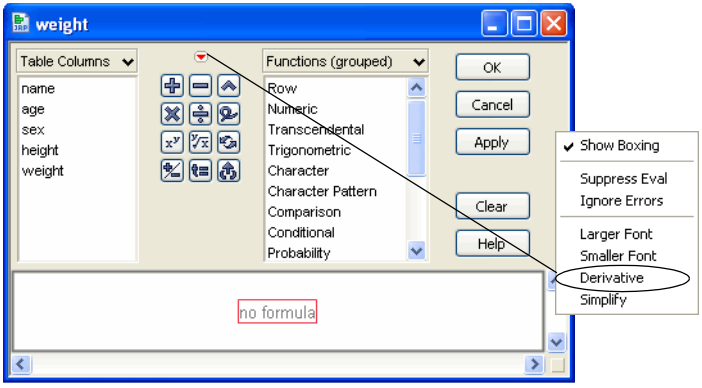
Using Formula Editor Options

There are several options the formula editor makes available to you as you create formulas. The following sections discuss each of these options.

Calculating Derivatives

The JMP formula editor can find and display the derivative of a function. The derivative is found with respect to the function argument (a single variable name) you highlight. Thus, in order to differentiate with respect to *x*, *x* must be one of the arguments in the expression. The red triangle menu found above the keypad contains the **Derivative** command, as shown in Figure 9.23.

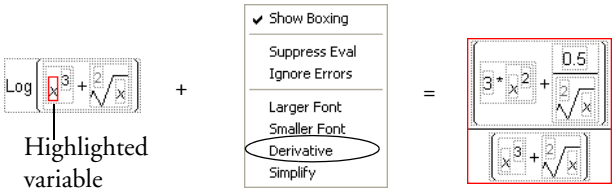
Figure 9.23 Select Derivative from the Keypad Menu Commands



To calculate a derivative

1 Enter a function.
2 Highlight a variable.
3 Select **Derivative** from the menu. Figure 9.24 shows the completion of these steps.

Figure 9.24 Using the Derivative Option



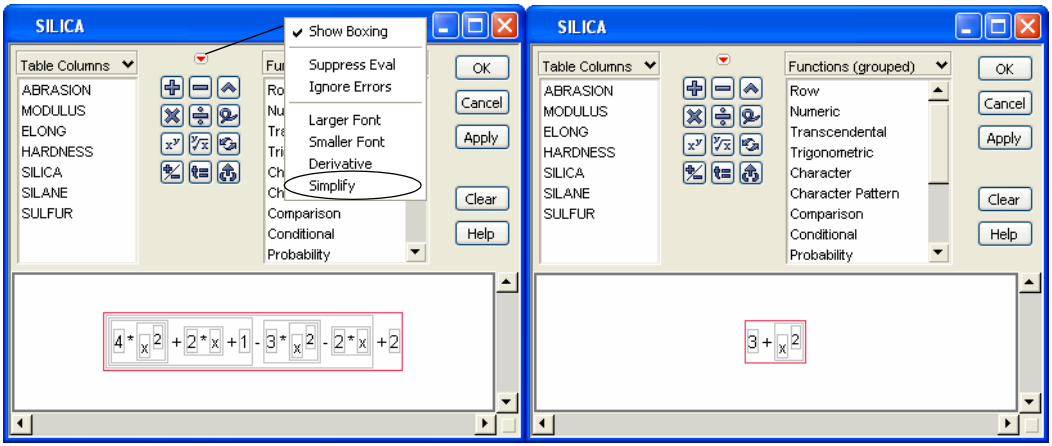
Simplifying Complex Formulas

When the formula editor contains a complex formula, JMP can simplify it using various algebraic rules. It can find constant expressions, distribute multiplication over addition, combine terms, and more.

To simplify complex formulas

1 Select a portion or all of the formula.
2 Click the red triangle icon above the keypad.
3 Select **Simplify** from the menu that appears, as shown in Figure 9.25.

Figure 9.25 Selecting Simplify (Left) Produces a Simplified Formula (Right)



Evaluating Formulas

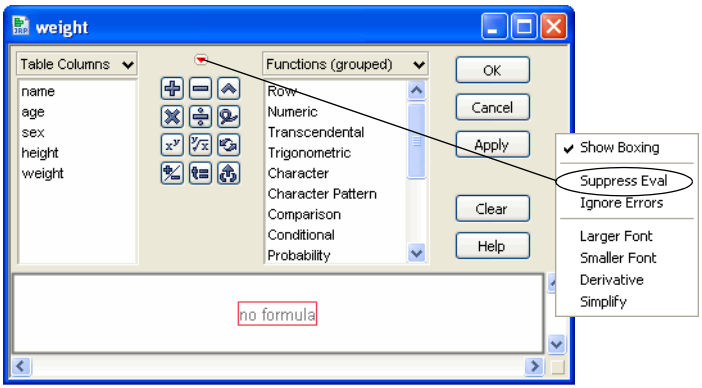
By default, JMP evaluates each formula you create. You can turn this evaluation off, or you can use it before you have finished creating a formula.

Suppressing Evaluation

Turning off evaluation is a useful formula development mode for building complex formulas. You can turn off evaluation and build sections of a formula, and evaluate only to test it. In particular, you can close the formula editor and reopen it at a later time to continue building a formula without JMP evaluating it.

To suppress formula evaluation, click the red triangle icon above the keypad and select **Suppress Eval** from the menu that appears, as shown in Figure 9.26.

Figure 9.26 Select Suppress Evaluation



When evaluation is suppressed, the formula icon appears grayed ( ) on Windows and Linux; ( ) on Macintosh):

- If the icon appears to the right of the red triangle icon in the formula editor, it indicates that formula evaluation is suppressed for that formula.
- If the icon appears beside the column name in the column panel, it indicates that the values in the column result from a formula. When formula evaluation is suppressed, this plus icon becomes gray. (See "Icon Indicators," p. 139, for details.)

Note: The **Apply** button ignores the formula evaluation setting. Thus, when formula evaluation is suppressed, clicking the **Apply** button overrides the suppression and evaluates the formula before it is applied to the column.

Ignoring Errors

Once you construct a formula and click **OK**, JMP checks behind the formula for error and alerts you of any errors that it finds. An error message appears for each error and asks if you want to ignore further errors.

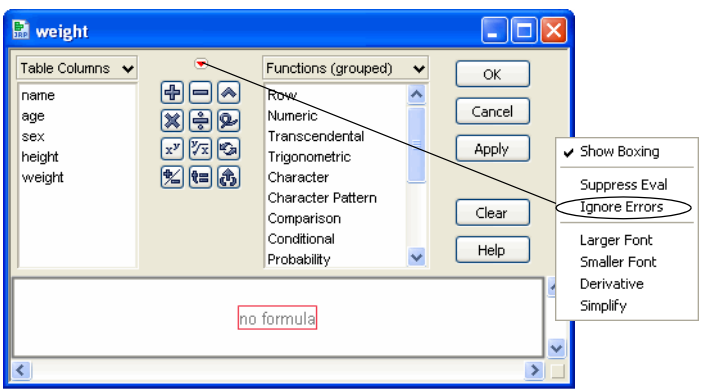
Sometimes you might want to suppress error messages while a formula is under development. For example, you might want the evaluated values for some rows without seeing an error message for each row that causes errors.

To have JMP ignore any errors it finds

1 Create a formula.

2 Click the red triangle icon above the keypad and select **Ignore Errors**, as shown in Figure 9.27.

Figure 9.27 Select Ignore Errors from the Keypad Menu Commands

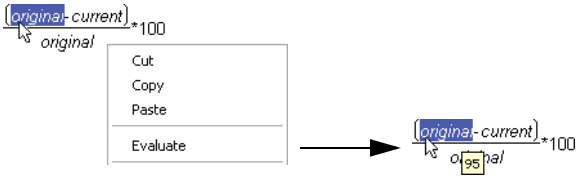


Viewing a Formula's Values from the Formula Editor

While in the Formula Editor, you can see the value of any expression within a formula with the **Evaluate** command. For column variables, you get the value at row 1. This is also true for parameters and expressions that evaluate to a constant value. To view values:

1 While in the formula editor, select the expression you want to know about.
2 Right-click (Ctrl-click on the Macintosh) the selected expression. This displays the menu in Figure 9.28.
3 Select **Evaluate**. The current value of the selected expression appears in a yellow box until you move the cursor.

Figure 9.28 Right-Click to See the Value of an Expression

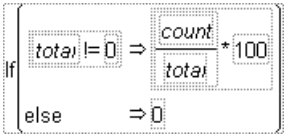


Viewing a Formula in JSL

You have the option of entering or changing any part of a formula in *text mode*. Text mode displays the formula in JMP Scripting Language (JSL). The entire formula (or any of its terms) appears in text mode when you double-click the white space inside the boxed formula area. The elements of that box appear as plain text and you can then edit the formula as you would in any text editor.

Any element of a formula can be displayed as a scripting command and then edited. After editing formula scripting commands, click outside the formula to see its formatted form. For example, the text for the standardization of weight is `(:weight – Col Mean(:weight)) / Col Std Dev(:weight)`. To enter an **If** statement in text form, add pairs of arguments for each **If/Then** clause in the statement, and a single last argument for the else clause if needed. In text form, the **If** statement in Figure 9.29 looks like this: `If(:total!=0, (:count/:total)*100, 0)`.

Figure 9.29 An **If** Statement in Formula Mode



Editing Formulas

If you need to change a formula after you have exited the formula editor, right-click (Ctrl-click on the Macintosh) the column name in the data grid and select **Formula**.

Correcting Mistakes

If you make a mistake while entering a formula, select **Edit > Undo**. **Undo** reverses the effect of the last (undo-able) command.

There are other editing commands to help modify formulas:

- Click the delete button ( ) on the formula editor keypad to remove the selected expression.
- Use the cut, copy, and paste shortcut commands or right-click a highlighted part of the formula and select **Cut**, **Copy**, or **Paste** from the menu.
- To rearrange terms or expressions, click to see the hand ( ) grab the term. Drag to move formula pieces.

Selecting Expressions

Use the keyboard arrow keys to select expressions for editing. You can also use the arrow keys to view the formula's order of precedence when either parentheses or the boxing option are not present. (See "Hiding and Showing Boxing," p. 318.)

Clicking an operator (+, –, *, ÷) in an expression selects the operator and its operands. Once an operator is selected:

- The left and right arrow keys move the selection across other associative operations having equal precedence within the expression.
- The up arrow extends the current selection by adding the operand and operator of higher precedence to the selection.
- The down arrow reduces the current selection by removing an operand and operator from the selection.

Deleting Functions

Deleting a function also deletes its arguments. Deleting a required argument or missing term from a function sometimes deletes the function as well. You can peel a function to delete it from its argument.

To peel a function from a single argument

1 Select the function.

2 Click the delete expression (peel) button ( ) from the formula editor keypad (Figure 9.30). Or, use the hand tool to drag the argument on top of its function.

Figure 9.30 Peeling an Argument

3 Complete formula changes.

4 Click **Apply**, and the new values fill the data table column automatically.

5 Once you have created a formula, you can change values in columns that are referenced by your

formula. JMP automatically recalculates all affected values in the formula's column.

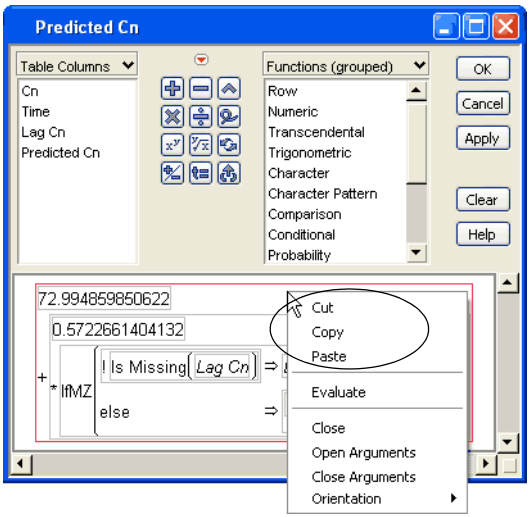
Cutting, Copying, and Pasting

You can cut or copy any expression or an entire formula and paste it into another formula display. Use the cut, copy, and paste shortcut commands or right-click a highlighted part of the formula and select **Cut**, **Copy**, or **Paste** from the menu, as shown in Figure 9.31. The following apply when you cut, copy, and paste a formula:

- When you paste it into another formula display, the formula appears in formatted form.
- The formula is saved on the clipboard as a JSL statement. Thus, if you copy it into other applications, it appears as a JMP Scripting Language (JSL) statement.

Note: Press the Shift key on your keyboard, and then click the red triangle to reveal a command called **Copy As SAS Formula**.

Figure 9.31 Cut, Copy, and Paste Commands



Clicking and Dragging

You can drag any part of a formula that can be selected to any other location that can be selected.

To click and drag

1 Place the arrow cursor inside an expression.
2 Click the expression. It is highlighted and the cursor changes to a hand cursor.
3 Drag across the formula. Destination expressions are highlighted.
4 Drag the selected expression to the new desired location. The selected expression is copied to the new location, where it replaces the existing expression.

Customizing Formulas

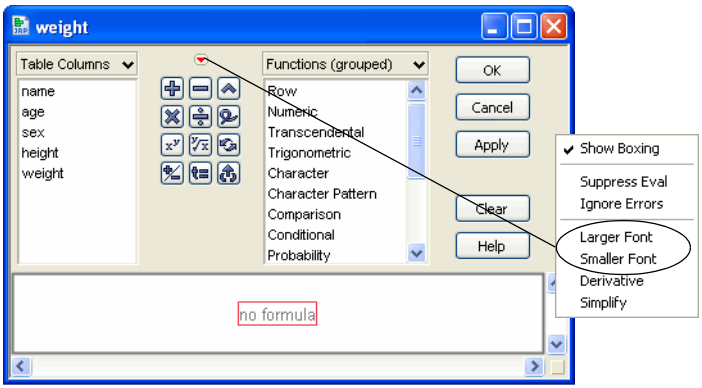
There are several ways you can customize formulas in the formula editor. The following sections describe how to change font size, show and hide boxing, change the orientation of the formula, and close arguments.

Changing the Font Size

To incrementally increase or decrease the font used to display the formatted formula

1 Click the red triangle icon above the keypad.
2 Select **Larger Font** or **Smaller Font**, as shown in Figure 9.32.
3 Repeat this process to further increase or decrease the font size.

Figure 9.32 Select Larger or Smaller Font



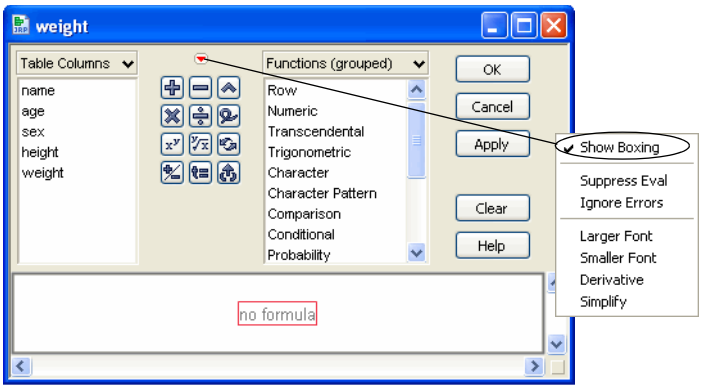
Hiding and Showing Boxing

By default, JMP outlines specific terms within the formula. This is called *boxing*. Boxing is useful when you want to select and modify a specific portion of a formula, or need to determine the order of evaluation that takes place.

To turn boxing on or off

1 Build a formula.
2 Click the red triangle icon above the keypad and select **Show Boxing**, as shown in Figure 9.33. When a check appears on the menu beside **Show Boxing**, the outline appears in the formula. When it does not, the outline does not appear.

Figure 9.33 Select Show Boxing from the Keypad Menu Commands



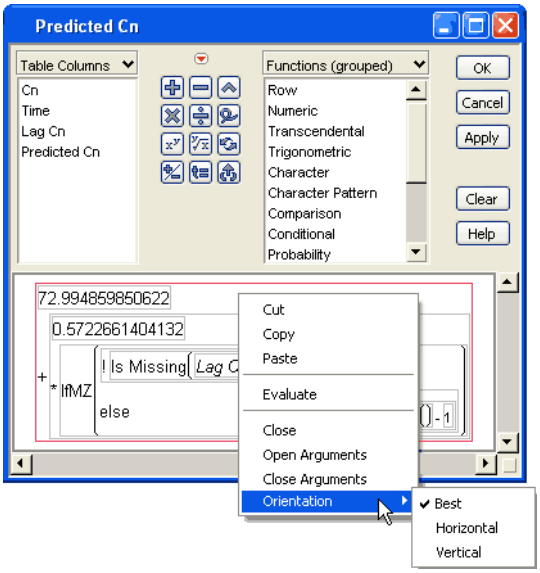
Changing a Formula's Orientation

By default, JMP gauges the size of a formula and displays it in the formula editor in the best orientation (horizontally or vertically). However, if you create a long formula, you might want to display it in a layout that satisfies your preference.

To change a formula's orientation

1 Build a formula.
2 Highlight an argument or formula.
3 Right-click (Ctrl-click on the Macintosh) what you have highlighted.
4 Select **Orientation** from the menu that appears, as shown in Figure 9.34.
5 Select from the **Orientation** options: **Best**, **Horizontal**, or **Vertical**.

Figure 9.34 Select Orientation



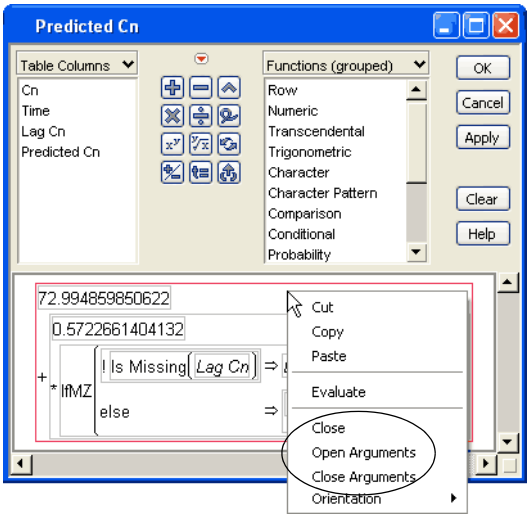
Opening and Closing Arguments

When a formula is too large to fit on the screen, you can close formulas and arguments.

To close an argument

1 Build a formula.
2 Highlight an argument or formula.
3 Right-click (Ctrl-click on the Macintosh) what you have highlighted.
4 Select **Close** or **Close Arguments** from the menu that appears, as shown in Figure 9.35.

Figure 9.35 Select From the Menu



Examples and Tutorials

To better familiarize yourself with building formulas, you can review the following examples and tutorials.

Using Basic Formula Editor Features

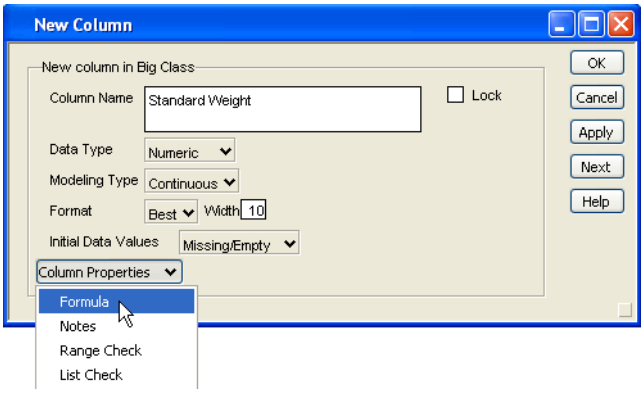
The following example uses Big Class.jmp to walk you through using the basic features of the formula editor. You can find Big Class.jmp by looking in a folder named Sample Data, which was installed when you installed JMP.

Big Class.jmp has a column called weight. Suppose you want a new column that computes standardized weight values.

To create this column using a formula to obtain its values

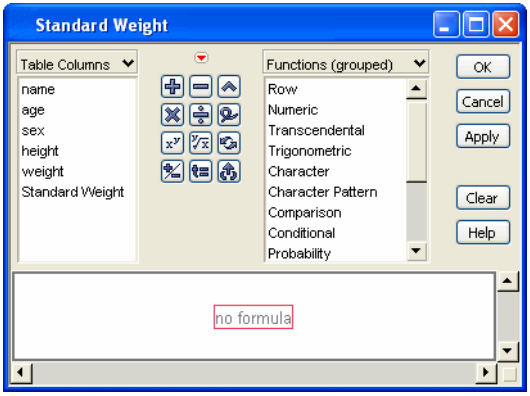
1 Open Big Class.jmp.
2 Select **Cols > New Column**.
3 Type the new name, Standard Weight, in the box beside **Column Name**.
4 Select **Formula** from the **Column Properties** menu, as shown in Figure 9.36.

Figure 9.36 Create a New Formula



5 Click the empty formula element in the formula editing area to select it, as shown in Figure 9.37. When you create a formula and **Show Boxing** is checked, the selected portion of the formula is outlined with a thin red line. (See "Hiding and Showing Boxing," p. 318.) All terms within the smallest nesting box relative to the place you clicked become selected, and the subsequent action applies to those combined elements.

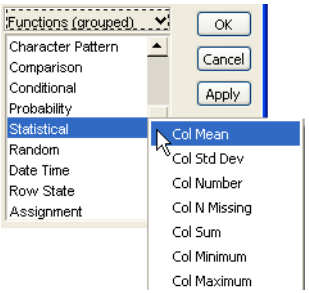
Figure 9.37 Select the Empty Formula Element



Next, enter the formula that standardizes the weight values.

1 While the initial missing term is selected, click weight in the formula element browser column selector list.
2 Click the minus button (⊟) in the formula editor keypad. A new missing term appears after the minus sign as shown in Figure 9.39.
3 Click weight again.
4 Click the function browser menu, and select **Statistical**.
5 Select **Col Mean** from the **Statistical** list, as shown in Figure 9.38.

Figure 9.38 Col Mean



6 Select the entire expression. The red box should now enclose the whole formula.

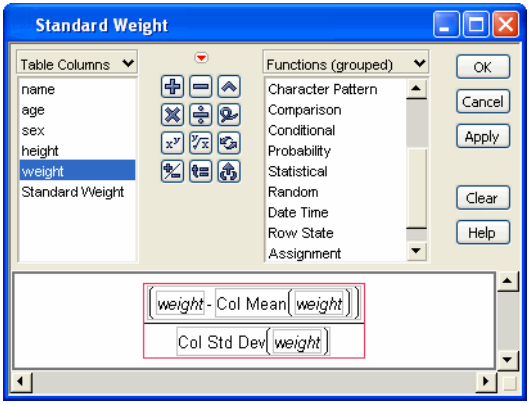
7 Click the division button ( ) in the keypad. The result gives a selected missing denominator for the whole expression.

8 Click weight again from the column selector list. It becomes selected in the denominator.

9 Select **Col Std Dev** from the **Statistical** list. The completed formula should look like that in Figure 9.39.

10 Close the formula editor by clicking **OK**. The new column fills with values. When a weight value changes, the calculated Standard Weight value automatically recalculates.

Figure 9.39 Building a Formula



Using Local Variables in a Formula

Suppose you want to compute the slope in a simple linear regression of *y* on *x* using the standard formula shown in Figure 9.40. One way to do this is to create two local variables, and name them XY and Xsqrd. (See "Using Local Variables," p. 289.) Then assign them to the numerator and the denominator calculations of the slope formula. Delimit each assignment with a semicolon, as shown in Figure 9.40. (Statements in the formula editor are actually JSL programming statements. Multiple statements in a formula must be separated by a semicolons.) The slope computation is simplified to XY divided by Xsqrd.

Figure 9.40 Local Variables in a Formula

Standard Slope Formula

$$\frac{\sum (x-\bar{x})(y-\bar{y})}{\sum (x-\bar{x})^2}$$

```
XY = Sum(i=1 to NRow()) ((Xi-Col Mean(X))*(Yi-Col Mean(Y)));
Xsqrd = Sum(i=1 to NRow()) (Xi-Col Mean(X))^2;
XY / Xsqrd
```

Note: You can also create local variables using the button on the on-screen keypad. Clicking this button creates a local variable with a default name in an expression and places a semicolon after it. The default name is *t1*, and additional local variables are named *t2*, *t3*, and so forth. You can change these default names by double-clicking and editing the name. However, you must be careful to rename each instance of the variable to avoid errors.

Using the Munger Function

The following examples show uses of the **Munger** function. In these examples, assume that there is a character column of names with "Veronica Layman" as one of its values. To simplify the examples, the literal name "Veronica Layman" is the search string instead of a column name.

See "Adding Character Arguments and Returning Character Strings," p. 300, for instructions on how to incorporate **Character** functions, such as **Munger**, into a formula.

Inserting Characters

This **Munger** example finds the blank between the first and last name, and inserts the middle initial "J." The formula **Munger("Veronica Layman", 1, " ", " J. ")** inserts the middle initial J., and evaluates as Veronica J. Layman.

Double quotes are required by the **Munger** function for literal strings, including strings that consist of a blank or when leading or trailing blanks are part of a string.

Deleting Characters

To delete one or more characters from a string

1 Designate the characters to delete as the **Find** string in the **Munger** function.
2 Enter an empty **Replace** string: two quotation marks with nothing between them.

For example, the function, **Munger("Veronica Layman", 1, "onic", "")** removes the "onic" from Veronica and evaluates as Vera Layman.

Note: A **Replace** field with a null (no value) string enclosed in quotation marks is different from a **Replace** field with no value. If you delete the **Replace** string altogether, **Munger** shows the argument name ("**Replace**") in the formula editor window and behaves as if that optional argument doesn't exist.

The resulting data type can also change from character to numeric, depending on the value of the **Find/Replace** argument.

Finding the Position (Index) of a Value

When the **Find/Length** field contains characters, **Munger** behaves like an index function and returns the numeric position of the first instance of the search string if it exists. For example, **Munger("Veronica Layman", 1, " ")** searches for a single blank and finds it in position nine. If the search string is not found, **Munger** returns a zero. This use of **Munger** produces the same result as the **Contains** function, as shown in "Adding Character Arguments and Returning Character Strings," p. 300.

Finding a Substring

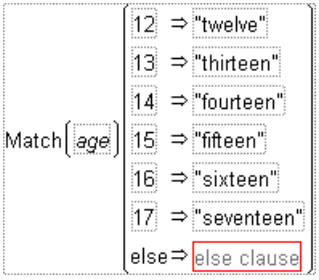
Munger can extract substrings. For example, to extract only the first name, **Munger("Veronica Layman", 1, 8,)** starts at position one, reads through position eight. The remaining characters are ignored because the replace argument is not defined. This yields "Veronica" and produces the same result as the **Substring**, as shown in "Adding Character Arguments and Returning Character Strings," p. 300.

An alternative way to find a substring is with a start value, any negative find value, and a **no replace** argument. **Munger("Veronica Layman", 9, –1,)** returns "Layman".

Using the Match Conditional Function

To follow this example, open Big Class.jmp from the Sample Data folder that was installed when you installed JMP. To assign character literals to age values in the Big Class data table, your formula would look like Figure 9.41.

Figure 9.41 Conditional Expression

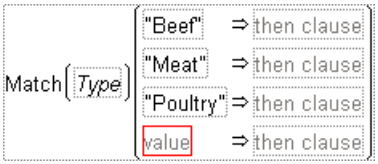


To use a shortcut for building Match conditionals

1 Select a column in the formula.
2 Hold the SHIFT key and select **Match** in the **Conditional** functions list.

For example, suppose you want a **Match** conditional for the nominal variable Type from the Hot Dogs.jmp data table (also found in the Sample Data folder). The variable Type has values of Beef, Meat, and Poultry. First select the column Type from the column selector list. Then with Type selected in the formula display, hold the SHIFT key and click **Match** to see the formula shown in Figure 9.42.

Figure 9.42 Automatically Filling a Match Conditional Statement

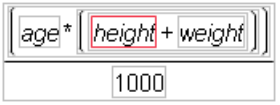


Using the Delete Expression Key

Repeated clicks on the delete expression key produce the following sequence of steps.

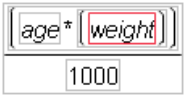
1 Start with a formula.

2 Select a formula element.

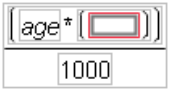


3 Click the delete expression button ( ).

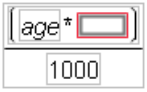
4 Click delete expression again.



5 Click delete expression again.



6 Click delete expression again.



7 Click delete expression again.

8 Click delete expression again.

9 Click delete expression again.

10 Click delete expression again.

Using Keyboard Shortcuts

You can use the keyboard shortcuts shown below to replace a selected expression with a function or argument.

Table 9.6 Keyboard Shortcuts in the Formula Editor

Replace a Selected Item with one of the following	Using This Shortcut
A missing element (•)	Delete
Subscript	[
() set of parentheses	(
Move the selection up a level	Up arrow
•	* on keypad or keyboard
+	+ on keypad or keyboard
−	– on keypad or keyboard
÷	/ on keypad or keyboard
+/−	Shift-minus
And	&
Not	!
Or	|
Power	^
New argument	,
x<y	<
x=y	=
x>y	>

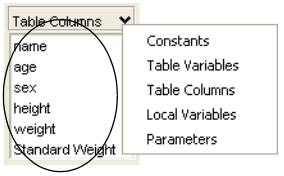
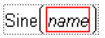
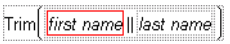
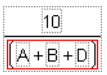
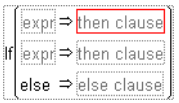
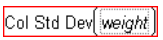
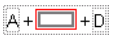
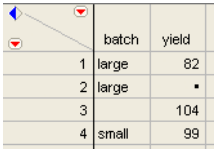
Glossary of Terms

Remember that:

- Functions always *operate* on selected expressions.
- Arguments are always grouped with functions.
- To find which expressions serve as a function's arguments, select that function in the formula.
- The boxed groupings show how order-of-precedence rules apply and show which arguments are deleted when you delete a function. See "Ordering Expressions in Formulas," p. 310, for details.

Table 9.7 contains terms used for the parts of the formula itself.

Table 9.7 Terms Used in the Formula Editor

Element	The name of a constant, table variable, table column, local variable, or parameter that appears in the element browser list.	
Argument	Any element or an entire expression (including mathematical operands) that is operated on by a function.	
Term	Indivisible parts of an expression, such as constants and variables.	
Expression	Any part of a formula that can be selected as a single unit, including terms, missing terms, and functions grouped with their arguments, as well as the entire formula.	
Clause	A complete segment in a conditional function.	
Function	A mathematical or logical operation that performs a specific action on one or more arguments. Functions include most items in the function browser list and all keypad operators. Functions always *operate* upon selected expressions, and arguments are always grouped with functions. To find which expressions serve as a function's arguments, select that function in the formula. The boxed groupings also show how order-of-precedence rules apply and show which arguments are deleted when you delete a function.	
Missing term	Any empty place holder for an expression, represented by an empty box.	
Missing value	Excluded or null data consisting of the missing value mark (•) for numeric data or null character strings for character data.	

Chapter 10

Personalizing JMP

Customize Preferences, Toolbars, and Menus

This chapter describes ways to tailor JMP to fit your personal preferences.

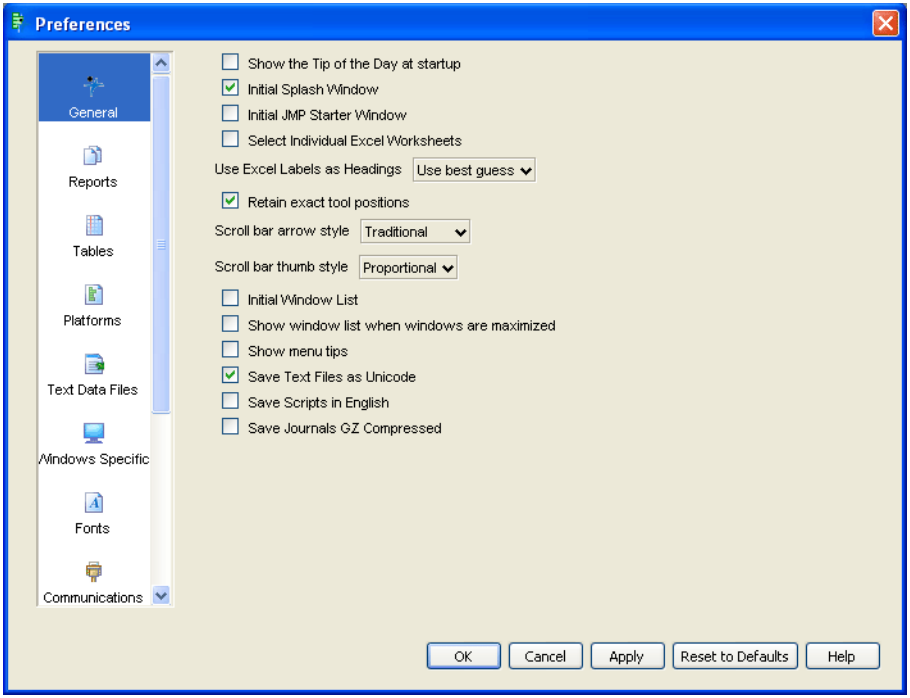
- JMP preferences enable you to specify general and specific settings and save the settings so they are associated with your JMP session.
- Complete customization of menus and toolbars give the flexibility to show only the commands you need or to set up JMP for groups with special interests (Windows only).

To change preferences

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh). The window in Figure 10.1 appears with the **General** preferences category showing.

2 Click a category and make selections. Click **Apply** to see the results, and then click **OK**.

Figure 10.1 The General Preferences Window (Windows)

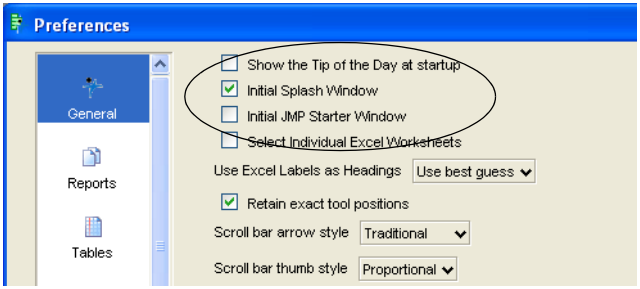


Contents

Changing Startup Preferences . . . 331
Preferences for Opening Excel Files . . . 333
Changing Formula and Scripting Options . . . 334
Formula Evaluation . . . 334
Script Evaluation . . . 335
Saving Scripts in Different Languages . . . 335
Changing Data Table Options . . . 335
Changing Report Options . . . 337
Customizing Analysis Settings . . . 337
Menu Tips (Windows Only) . . . 338
Dates, Times, Names and Notes . . . 338
Table Styles . . . 339
Marker Sizes, Shapes, and Themes . . . 339
Color Themes . . . 339
Setting Graph Height . . . 339
Closing and Saving Sessions . . . 340
Closing and Saving Reports . . . 340
Laser Pointer Options . . . 341
Marker Drawing Speed Threshold . . . 341
Saving Text Files Without Using Unicode . . . 342
Changing Color Schemes and Languages . . . 342
Customizing Fonts . . . 344
Specifying Graphic Formats . . . 346
Adjusting Communications Settings (Windows and Linux Only) . . . 347
Adjusting Proxy Settings (Linux Only) . . . 348
Specifying File Locations and Associations . . . 348
Customizing Text Import/Export Options . . . 350
Specifying Settings for SAS Integration . . . 351
Controlling JMP Updates . . . 353
Personalizing Toolbars (Macintosh) . . . 354
Personalizing Toolbars (Windows and Linux) . . . 354
Merging Menus from Earlier Versions (.jmpcmd Files) . . . 366
Importing Customized Menus and Toolbars (.jmpmenu Files) . . . 366
Customizing Menus (Windows and Linux Only) . . . 366
Saving Menus and Toolbars (Windows and Linux) . . . 374

Changing Startup Preferences

You can change the system defaults so when JMP starts, it displays only information you specify.



Tip of the Day Window

To change the default setting for the Tip of the Day window:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **General** category.
3 Check **Show Tip of the Day at Startup** to show the window. Uncheck it to hide the window at startup. For details about the Tip of the Day, see "The Tip of the Day Window," p. 9.

Splash Window

To change the default setting for the splash window that appears when you start JMP:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **General** category.
3 Check **Initial Splash Window** to show the initial splash window at startup. Uncheck it to hide the window at startup.

JMP Starter Window

To change the default setting for the JMP Starter window:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **General** category.
3 Check **Initial JMP Starter Window** to show the JMP Starter window at startup. Uncheck it to hide the window at startup. For details about the JMP Starter window, see "The JMP Starter Window," p. 10.

The Window List (Windows Only)

JMP provides access to a window list, which is a pane at the left side of the JMP application that lists each open JMP window The list makes it easy to see your open windows and navigate from one window to another.

To view the window list, select **View > Window List**.

Or, to change the default behavior so the list always appears:

1 Select **File > Preferences**.
2 Click the **General** category.
3 Check **Initial Window List** to show the list at startup. Uncheck it to hide the list at startup.

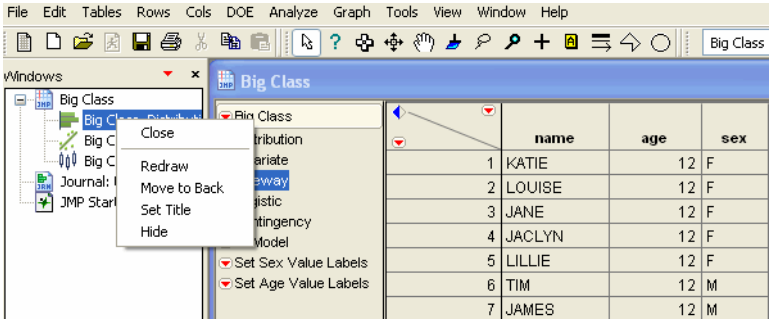
The window list appears automatically when you maximize your windows under the Windows Operating System. To change this behavior,

1 Select **File > Preferences**.
2 Click the **General** category.
3 Check **Show window list when windows are maximized** to toggle the behavior on and off.

To use the window:

- Click the name of a window to bring it to the front of the screen.
- Right-click the name of a window in the list to close, rename, redraw, move, or hide it (Figure 10.2).
- Click the close icon in the upper right corner of the list to close it.

Figure 10.2 The Open Windows Panel



Saving Journals in a compressed format

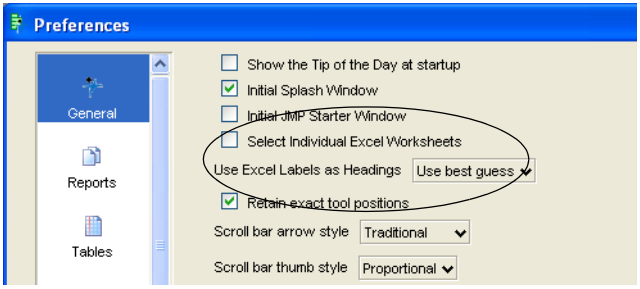
You can save JMP journals in a compressed format to save disk space.

1 Select **File > Preferences**.
2 Click the **General** category.
3 Check **Save Journals GZ Compressed** to save the journal in GZ compressed format.

Preferences for Opening Excel Files

When opening Excel files, JMP gives you the flexibility to change some preferences related to how the file is opened.

Figure 10.3 Preferences for Opening Excel Files



Importing Excel Labels as JMP Column Names (Windows and Macintosh Only)

When JMP opens a Microsoft Excel file, it places the first line of data into the first row in JMP. However, you might have an Excel file that contains labels in its first line. In that case, you might want to use those labels as column names in JMP. Alternatively, you might want JMP to make a guess at the function of the labels. To tell JMP how to use Excel labels as its column names:

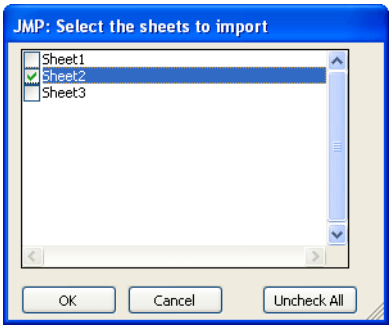
1 Select **File > Preferences** (Windows) or **JMP > Preferences** (Macintosh).
2 Click the **General** category, as shown in Figure 10.3.
3 Choose an option beside **Use Excel Labels as Headings**.

Excel Workbook/Worksheet Selection (Windows and Macintosh Only)

When JMP opens a Microsoft Excel workbook that contains multiple worksheets, it opens all of the worksheets by default. If you would like to open only certain worksheets:

1 Select **File > Preferences** (Windows) or **JMP > Preferences** (Macintosh).
2 Click the **General** category.
3 Click the box beside **Select Individual Excel Worksheets**. You can now specify which sheets to import when you open an Excel workbook, as shown in Figure 10.4. For details about opening Excel files, see "Opening Excel and OpenOffice Files," p. 22.

Figure 10.4 Specify which Excel Worksheets to Import



Changing Formula and Scripting Options

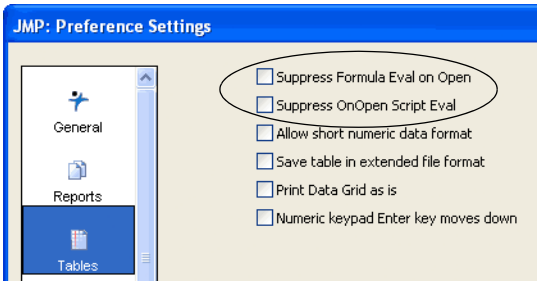
When creating formulas and scripts, you might want to set some preferences to meet your ongoing needs. This section describes some preferences JMP provides. For details about setting the preferences for the JSL Script Editor, see the *JMP Scripting Guide*.

Formula Evaluation

To change the default setting for evaluating formulas upon opening a data table:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Tables** (Windows/Linux) or **General** (Macintosh) category, as shown in Figure 10.5.
3 Check **Suppress Formula Eval On Open** to suppress evaluation of formulas when a data table is opened. Uncheck it to have JMP evaluate the formulas upon opening the table.

Figure 10.5 Changing Formula and Scripting Options



Script Evaluation

If you save a script to a data table and name it OnOpen, that script is automatically run whenever the data table is opened. This is the default action, but you can change your preference so that data table scripts are not automatically run.

To change the default setting for evaluating scripts upon opening a data table:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Tables** category, as shown in Figure 10.5.
3 Check **Suppress OnOpen Script Eval** to suppress automatically executing scripts when the table is opened.

Saving Scripts in Different Languages

Non-English versions of JMP can save scripts in either English or your local language. User-specified values (such as column names and text strings) in these scripts appear as they do in the data table, but command words (such as `Distribution` and `Set Value`) appear in English rather than the local language in order for the script to run on JMP in English. JMP properly displays non-Roman characters (such as Japanese variable names) in JMP in English when the fonts support the necessary characters.

To specify that a script be saved in English when using a non-English version of JMP:

1 Select **File > Preferences**.
2 Click the **General** category.
3 Check **Save Scripts in English**.

Changing Data Table Options

JMP enables you to make changes to the way elements operate in the data table. This section lists the changes and how to make them.

Highlight Movement

When a data table cell is highlighted and you press the Enter/Return key on the keyboard, the highlight moves down. Pressing either the Tab key or the Enter key on the numeric *keypad* located to the right of the keyboard moves the highlight to the right.

However, you can change the default so pressing the Enter key on the *numeric keypad* moves the highlight down instead of to the right.

To change the default:

1 Select **File > Preferences**.
2 On Windows/Linux, click the **Tables** category.
On Macintosh, click the **General** category.

3 Place a check beside **Numeric keypad Enter key moves down** (Windows and Linux) or **Enter Key moves down** (Macintosh).

Scroll Bar Styles (Windows Only)

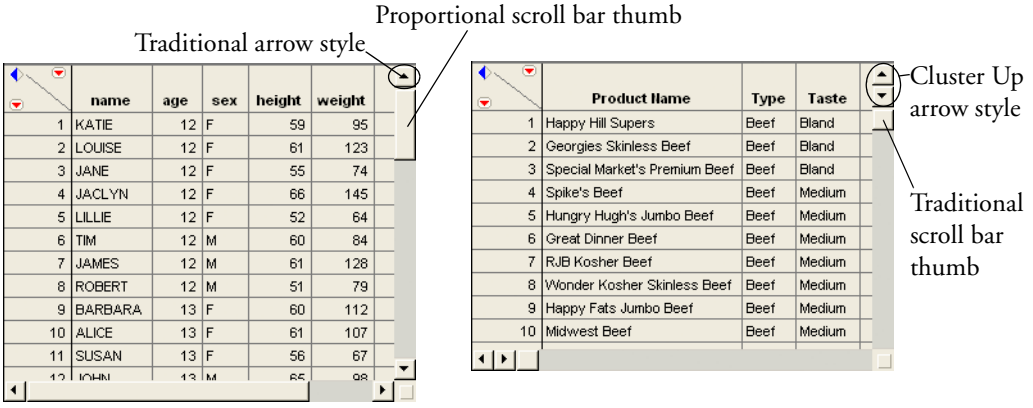
To specify the arrow styles JMP uses in its scroll bars:

1 Select **File > Preferences**.
2 Click the **General** category.
3 Check one of the following:

Scroll bar arrow style Selecting **Traditional** places arrows at the top and bottom of the vertical scroll bar and the left and right of the horizontal scroll bar. Selecting **Cluster Up** places both arrows at the top of the vertical scroll bar and at the left of the horizontal scroll bar. Selecting **Cluster Down** places both arrows at the bottom of the vertical scroll bar and the right of the horizontal scroll bar. See Figure 10.6 for examples.

Scroll bar thumb style Selecting **Proportional** causes the scroll bar to display a thumb that is proportional to the length of the window's content. Selecting **Traditional** causes the scroll bar to display a thumb that is a constant size, regardless of the length of the window's content. See Figure 10.6 for examples.

Figure 10.6 Scroll bar Styles



	name	age	sex	height	weight
1	KATIE	12	F	59	95
2	LOUISE	12	F	61	123
3	JANE	12	F	55	74
4	JACLYN	12	F	66	145
5	LILLIE	12	F	52	64
6	TIM	12	M	60	84
7	JAMES	12	M	61	128
8	ROBERT	12	M	51	79
9	BARBARA	13	F	60	112
10	ALICE	13	F	61	107
11	SUSAN	13	F	56	67

	Product Name	Type	Taste
1	Happy Hill Supers	Beef	Bland
2	Georgies Skinless Beef	Beef	Bland
3	Special Market's Premium Beef	Beef	Bland
4	Spike's Beef	Beef	Medium
5	Hungry Hugh's Jumbo Beef	Beef	Medium
6	Great Dinner Beef	Beef	Medium
7	RJB Kosher Beef	Beef	Medium
8	Wonder Kosher Skinless Beef	Beef	Medium
9	Happy Fats Jumbo Beef	Beef	Medium
10	Midwest Beef	Beef	Medium

Extended File Format

Starting with JMP 8, files can be drastically larger than before—up to 65,5536 columns. To accomplish this feature, much of the internal data table coding was changed to support the large (that is, extended) file format. By default, this option is on. However, if you want to open your JMP table in versions earlier than JMP 8, you need to uncheck this feature.

1 Select **File > Preferences**.
2 Click the **Tables** category.
3 Uncheck the **Save Data in extended file format** option.

Numeric Formats

JMP has the ability to store numeric data in as few as 8 bits (one byte). This option makes short-integer formats available to you when you select **Cols > Column Info** and assign a column a data type. When you use the correct short-integer format for your data, you will not see any difference in how the numbers display, but they will occupy less disk space. See "Using Short-Integer Format," p. 61, for details.

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Tables** category.
3 Check **Allow short numeric data format**.

Data Table Print Format

To print the JMP data table as it appears on the screen instead of resizing column widths to accommodate the content width:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Tables** category.
3 Check **Print Data Grid as is**.

Toolbar Positions (Windows Only)

To specify that the position of the toolbars stay the same between JMP sessions:

1 Select **File > Preferences**.
2 Click the **General** category.
3 Check **Retain Exact Tool Positions**.

Changing Report Options

You can customize settings for JMP reports so they are customized for your preferences. The sections below describe ways you can customize reports.

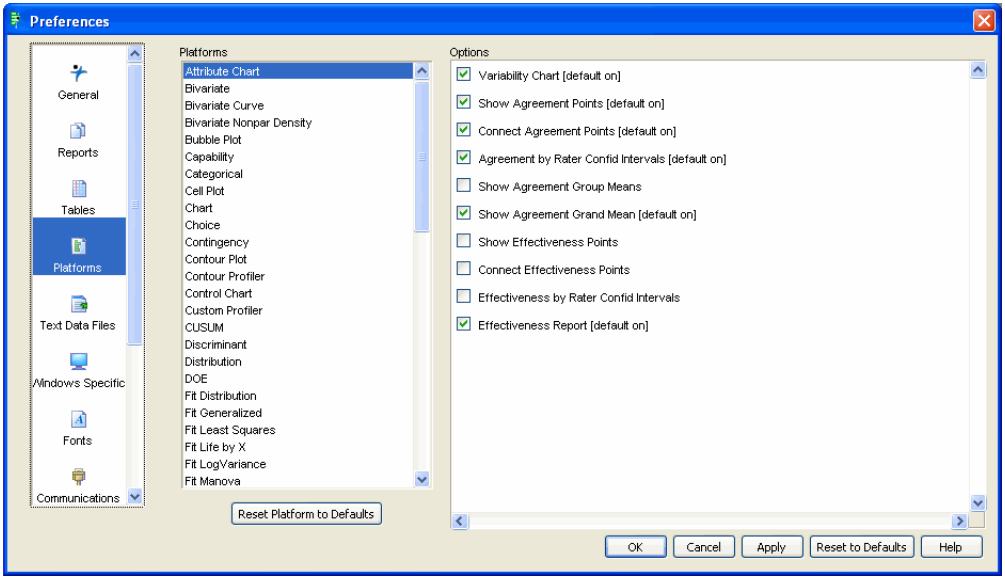
Customizing Analysis Settings

Each report analysis has a variety of plot and table options that are shown by default. However, there might be additional options you want to see each time you run a particular analysis. For example, a bivariate analysis shows points by default, but you might also always want to see a linear fit each time. By selecting the **Platforms** option in the left panel of the Preferences window, you can set the default options for analyses. (Analyses are run by evoking *platforms*, such as the Bivariate platform. Thus, the name of this category is **Platforms**.)

To set the default options for analyses:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Platform** category, as shown in Figure 10.7.
3 Highlight an analysis name in the **Select a Platform** list. Its available options appear in an **Options** box with the defaults checked.
4 Click the options you want to automatically appear when you run an analysis on the highlighted platform.

Figure 10.7 Platforms Tab



Menu Tips (Windows Only)

To change the default setting for the menu tips that appear when you pause your mouse over a red triangle menu item:

1 Select **File > Preferences**.
2 Click the **General** category.
3 Check **Show menu tips** to show the menu tips. Uncheck it to hide the tips.

Dates, Times, Names and Notes

To automatically add the date and time an analysis occurred at the top of an output report:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Check **Date Title on Output** to display the date and time the analysis occurred.
Check **Data Table Title on Output** to place the name of the data table and notes, if there are any, at the top of the report's output.

Hover Help

On some numeric output, JMP provides tooltip-style help when you circle the mouse over a result. This behavior can be toggled off and on.

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Uncheck **Hover Help** to turn Hover help off. Check it again to turn Hover Help on.

Table Styles

To set the default table style for all reports.

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Click the menu beside **Report Table Style** and select **Plain**, **Bordered**, **Embossed**, **Beveled**, or **Separator**.

Marker Sizes, Shapes, and Themes

To set the default marker size or shape for all plots:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 To set the size, click the menu beside **Graph Marker Size** and select an option To set the shape, click **Graph Marker** and select an option. To set the marker theme, select **Graph Marker Theme** and select an option.

Color Themes

To set the default continuous or categorical color theme,

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Click the menu beside **Continuous Color Theme** or **Categorical Color Theme** and choose an option.

Setting Graph Height

To set the default graph height (in pixels),

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Enter a number beside **Graph Height**.

Closing and Saving Sessions

Each time you use JMP, it is called a *session*. By default, JMP asks if you would like to save the state of your session each time you exit the program. If saved files are open when you exit, when you return to JMP it will reopen those saved files and rerun any analyses. This enables you to quit JMP, and then return to it later without manually having to open the files with which you were previously working.

To change the default method of saving sessions:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Click the menu beside **Save the session when exiting** (Figure 10.8) and select an option.

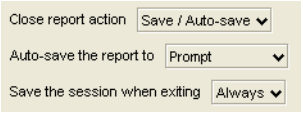
Always When you quit JMP, it is always automatically saved.

Never When you quit JMP, it is never saved.

Prompt When you quit JMP, you are asked you if you would like to save it.

For details about JMP sessions, see "Saving JMP Sessions," p. 122.

Figure 10.8 Closing and Saving Reports and Sessions



Closing and Saving Reports

When you close reports, you might want JMP to treat them like other documents, or as disposable views of your data. JMP has preferences that you can set so it treats reports in ways that best fit your needs. These preferences include customizing what happens when you close or save a report.

To customize how JMP treats reports when you close them:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Click the menu beside **Close report action** (Figure 10.8) and select an option.

Prompt When you close a report, JMP asks you if you would like to save it.

Discard When you close a report, JMP never saves it.

Save / Auto-save When you close a report, JMP always automatically saves it according to how you have selected in the menu beside **Auto-save the report to**.

To customize how JMP saves reports:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 Click the menu beside **Auto-save the report to** (Figure 10.8) and select an option.

Prompt When you close a report, JMP asks you if you would like to save it.

Data table Script When you close a report, JMP saves it as a script in the open data table. To open the report again, right-click the script in the data table and select **Run Script**.

Journal Window When you close a report, JMP saves it to a journal window. For information about journals, see "Importing Data," p. 13, and "Saving Using the Journal Command," p. 116.

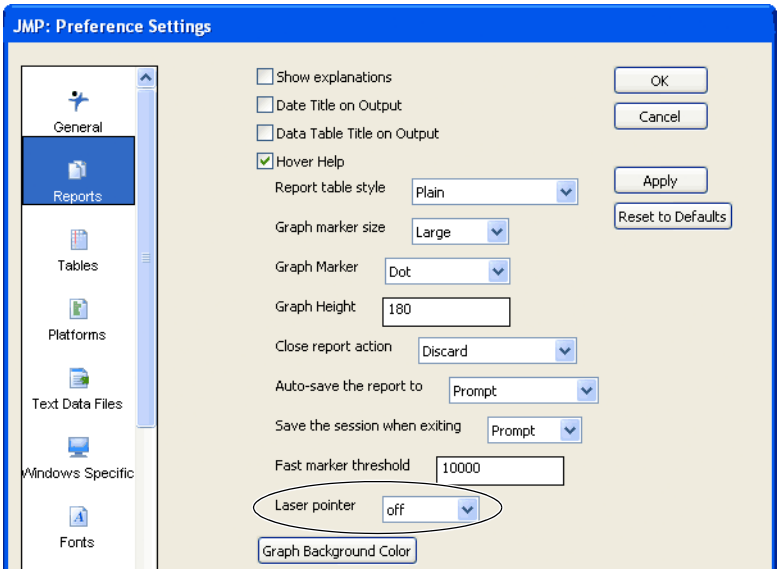
Log Window When you close a report, JMP writes it to the log window. For information about log windows, see "Saving a Log Window," p. 128.

For details about saving JMP reports, see "Saving Reports," p. 114.

Laser Pointer Options

JMP has a built-in laser pointer that enables you to visually emphasize parts of a report. It is off by default. To turn it on:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Reports** category.
3 From the Laser pointer menu, select to turn it off, or select the color you want the laser pointer to use.



To use the laser pointer, click and drag anywhere on a report where the cursor is a left-pointing arrow. The colored line of the laser pointer persists until you release the mouse button.

Marker Drawing Speed Threshold

When JMP refreshes a report window, it can draw markers on a plot at two different speeds: normal and fast. If JMP is in normal drawing mode and the number of markers in a graph are more than the specified threshold number, JMP automatically switches to fast mode.

To change the threshold number:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).

2 Click the **Reports** category.
3 Type the threshold number in the box beside **Fast Marker Threshold**.

For more information about normal and fast drawing mode, see "Changing the Marker Drawing Mode and Transparency," p. 189

Saving Text Files Without Using Unicode

JMP uses the Unicode character set, which supports special characters such as é and ½. It saves files without special Unicode characters as plain text automatically. However, files that contain Unicode characters can be saved from JMP so that they can be opened in older applications that do not support Unicode (such as JMP 5.1.2 and earlier). To do this, first disable Unicode feature:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **General** category.
3 Uncheck the box beside **Save Text Files as Unicode**. Your text files will now be saved as plain (legacy) text.

Changing Color Schemes and Languages

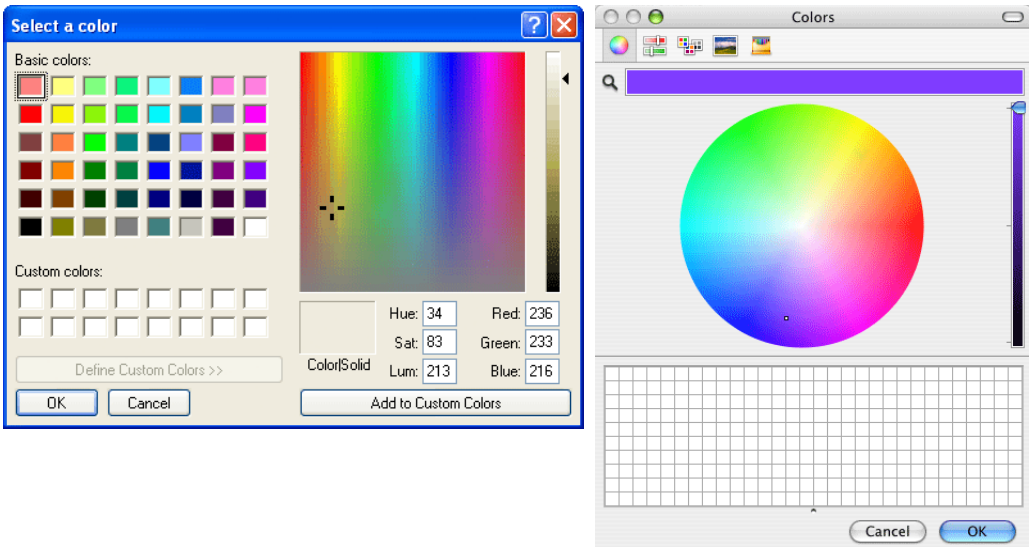
JMP enables you to customize the background color of its graphs and reports. It also lets you alter the color of the title bars. This section describes how to customize these color schemes.

Changing Graph Colors

You can set a background color that, by default, applies to all graphs:

1 Select **File > Preferences**.
2 Click the **Reports** category.
3 Click the **Graph Background Color** button.
4 Click a color in the palette (Figure 10.9). Or, on Windows and Linux, create a custom color by entering numbers for a new color values and clicking **Add to Custom Colors**.
5 Click **OK**.

Figure 10.9 Custom Color Palette on Windows and Linux (Left) and Macintosh (Right)



Changing Window Colors (Windows and Linux Only)

On Windows and Linux, you can set a background color that, by default, applies to all windows:

1 Select **File > Preferences**.
2 On Windows, click the **Windows Specific** category and click **Choose Color** in the **Window Background Color** section.
On Linux, click the **Linux Specific** category and click the **Window Background** button.
3 Click a color in the palette (Figure 10.9). Or, create a custom color by entering numbers for a new color values and clicking **Add to Custom Colors**.
4 Click **OK**.

Highlighting Title Bars (Windows Only)

To give title bars in the data table and report windows a light shade of gray:

1 Select **File > Preferences**.
2 Click the **Windows Specific** category.
3 Click the box beside **Highlight Outline Headers**.
4 Click the **Apply** button on the Preferences window to preview the result.

Changing the Display Language

By default, JMP uses your current locale when choosing its display language. To specify the display language yourself,

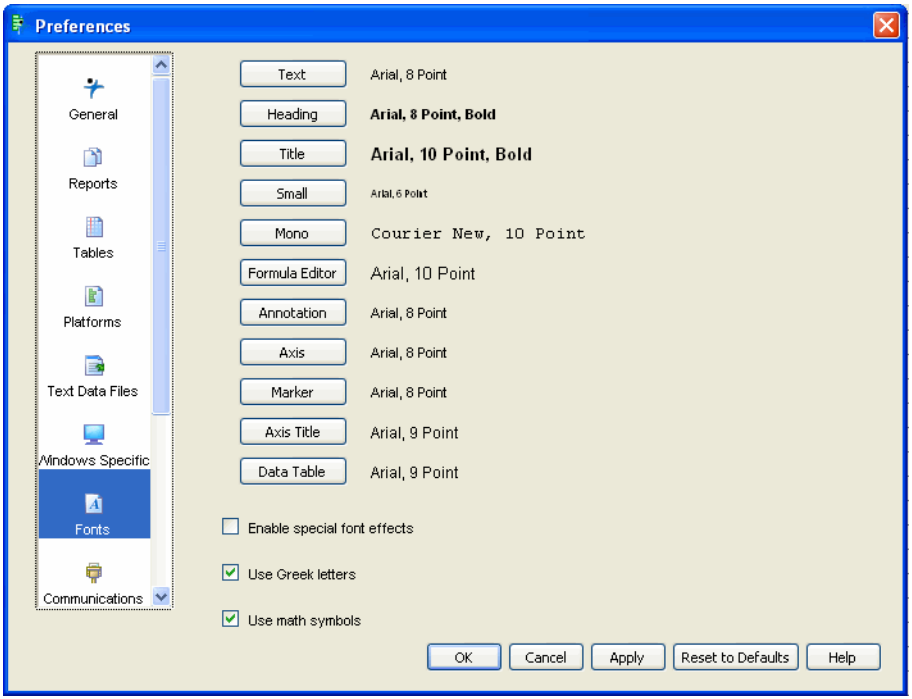
1 Select **File > Preferences**.
2 Click the **Windows Specific** category.
3 Click the menu under **Display Language** and choose one of the available languages.

If you would like to also use this setting to specify number, date, and currency formats, check the box beside **Use JMP language rather than System locale settings for number, date and currency formats**.

Customizing Fonts

One way you can customize the appearance of reports, data tables, and scripts is to change text styles using the **Fonts** category (Figure 10.10), which lists the fonts and sizes available in your system and the regular, bold, italic, and bold italic styles. Your specifications are then used as the default settings.

Figure 10.10 The Fonts Tab (Windows)



Changing Font Types and Sizes

To change the default font types and sizes:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Fonts** category.

3 Select the area to which you want to make changes.

Text Sets the font for the text portion of a JMP analysis report.

Heading Sets the font for the heading of columns in an analysis report.

Title Sets the font for the title shown in all title bars.

Small Sets the font for small text. The blue diamond shaped icon is the disclosure button. Click the disclosure button to close the side panels of the data table and reveal the small text in the upper left corner of the data grid.

Mono Sets the font for the font used in the JMP Scripting Language (JSL) editor for script commands.

Formula Editor Sets the font for the expressions entered into the formula editor.

Annotation Sets the default font used in annotations.

Marker sets the font to use on alphanumeric markers.

Axis Title sets the font for axis titles.

Axis Sets the font information for the axis labels.

Menu (Linux Only) Sets the font for the JMP main menu, labels on check boxes, and other textual objects.

Data Table sets the font for displaying data in the data table.

Note: To quickly change the font size from anywhere in JMP, press Ctrl-Shift-+ (plus sign) to increase and Ctrl-Shift-- (minus sign) to decrease the size. On Macintosh, press Command-+ (plus sign) and Command-- (minus sign).

Using Underlines and Strikeouts on Windows

To view the underline and strikeout text options on Windows:

1 Select **File > Preferences**.
2 Click the **Fonts** category.
3 Check **Enable special font effects**.
4 Select the area to which you want to make changes (**Text**, **Heading**, **Title**, and so on).
5 In the window that appears, place a check beside **Strikeout** and/or **Underline**.

Using Greek Letters and Math Symbols

To enable and disable the use of Greek letters and math symbols in JMP:

1 Select **File > Preferences**.
2 Click the **Fonts** category.
3 Check **Use Greek Letters** and/or **Use Math Symbols**.

Specifying Graphic Formats

You can specify a default format for JMP to use when placing graphics on the clipboard or saving as .rtf and .html files.

To specify the default formats:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).

2 On Windows, click the **Windows Specific** category (Figure 10.11).

On the Macintosh, click the **MacOS Settings** category.

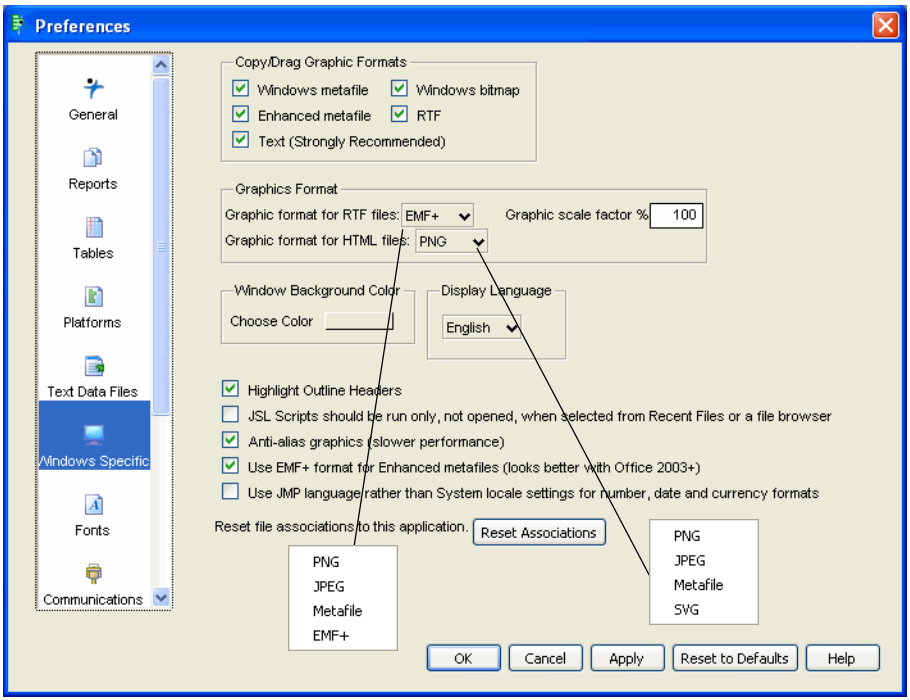
On Linux, click the **Graphic Formats** category.

3 Select one of these formats:

Table 10.1 Graphic Format Preferences

Action to be Taken on Graphic	How to Set Up the Format
Use a certain format when dragging and dropping or copying and pasting graphic into another application (Windows only)	Click to place a check beside the desired formats in the **Copy/Drag Graphic Formats** area.
Use a certain format for graphics when saving a JMP report as a .rtf file or .html file (Windows only)	Select a format beside **Graphic Format for RTF/ HTML Files**.
Have graphics appear larger or smaller than their original size when they are saved as .rtf files or dragged and dropped into another application	In the **Graphics Scale Factor %** text box (Windows /Macintosh) or the **Scale** text box (Linux), enter the percentage at which you want graphics to appear in another application. This feature might not work with all versions of your chosen application.

Figure 10.11 The Windows Specific Tab on Windows



Specialized Graphics Settings (Windows Only)

JMP lets you customize the use of anti-aliased and enhanced metafile graphics on Windows.

1 Select **File > Preferences** .
2 On Windows, click the **Windows Specific** category (Figure 10.11).
3 Choose either **Anti-alias graphics (slower performance)** or **Use EMF+ format for Enhanced metafiles (looks better with Office 2003+)**.

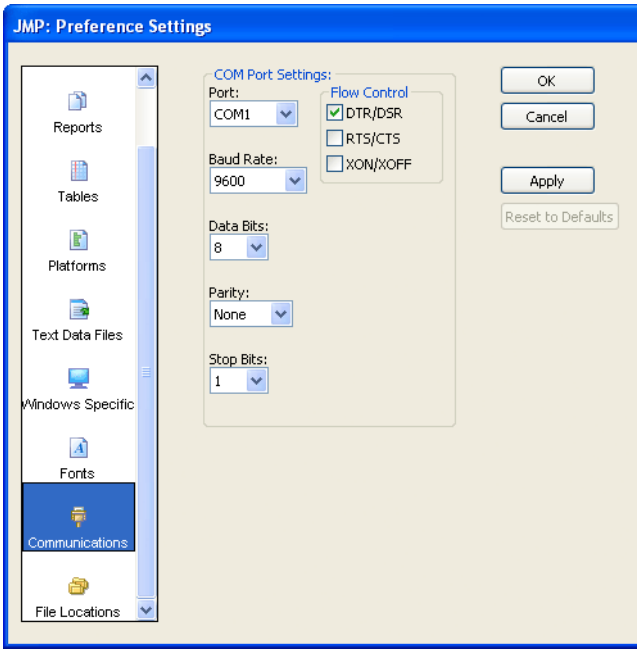
Adjusting Communications Settings (Windows and Linux Only)

The communications settings only need to be specified if you are using an instrument to read data from an external source. To specify the settings:

1 Select **File > Preferences**.
2 Click the **Communications** category.

Refer to the documentation for your instrument to find the appropriate settings. See the *JMP Statistics and Graphics Guide* for details.

Figure 10.12 The Communications Settings Tab



Adjusting Proxy Settings (Linux Only)

You can import data from Internet sites, intranet sites, servers, and FTP addresses by selecting **File > Internet Open**. If you are using a proxy server to connect to the Internet on Linux, you might need to set up your proxy settings before opening files:

1 Select **File > Preferences**.
2 Click the **Proxy Configuration** category.
3 Enter your proxy server address.

Specifying File Locations and Associations

You can change the default locations of JMP system files, and you can also set the file associations of JMP files so they are always opened using this release of JMP. The sections below provide information about how to make these changes.

Specifying File Locations (Windows and Linux Only)

Although you should leave most installed files in the default installation directory, you can change the default locations of JMP system files. Instances when you might want to move them include:

- You want to move large files, such as the help files (for example, the jmp.chm file on Windows and the .html files on Linux), to somewhere other than your hard drive.
- Information in the installation directory is needed by technical support.
- You want to designate a directory where the preferences file directory (jmp.pfs on Windows and jmpPreferences on Linux) should be stored. You can point to a directory even if there is no jmp.pfs or jmpPreferences file already in it. When JMP saves the preferences, it will create the jmp.pfs or jmpPreferences file in that directory.

Additionally, you can set the associations so that when you open a file, JMP always starts the path in a specified location.

To change the default file association:

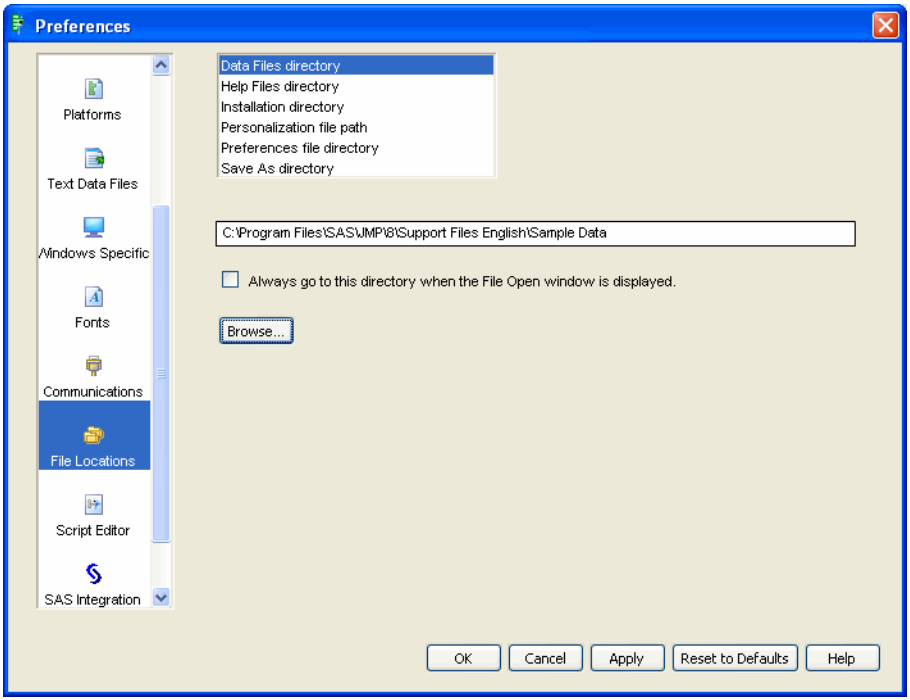
1 Select **File > Preferences**.
2 Click the **File Locations** category, as shown in Figure 10.13.
3 Highlight the item in the list whose location you would like to change. Its current location appears in the text box.

   Note: On Windows, select **Data Files directory** or **Save As directory** when you want JMP to use the specified directory every time you select **File > Open**, **Save**, or **Save As**. You must also check the box beside **Always go to this directory when the File Open is displayed** or **Always go to this directory when Data/Journal Save As is displayed**.

   On Linux, select **Data Files directory** and set the directory path you want JMP to use every time you select **File > Open**.
4 Click **Browse**.
5 Navigate into a directory where the file should be stored and select it.

Note: To reset the file location settings to the default location, delete the path of the current location and leave the box empty.

Figure 10.13 The File Location Tab



Resetting the File Associations (Windows Only)

To set the file associations of JMP files so they are always opened using this release of JMP, select **File > Preferences > Windows Specific,** and click the **Reset Associations** button. This ensures that when you double-click JMP files or you use automation commands (and JMP is not open), the file is opened with the desired release.

You might need to set file association if:

- You have more than one release of JMP installed
- You are using automation commands to open JMP files
- You previously altered the JMP file type associations using the Windows operating system interface and now want to restore them

Customizing Text Import/Export Options

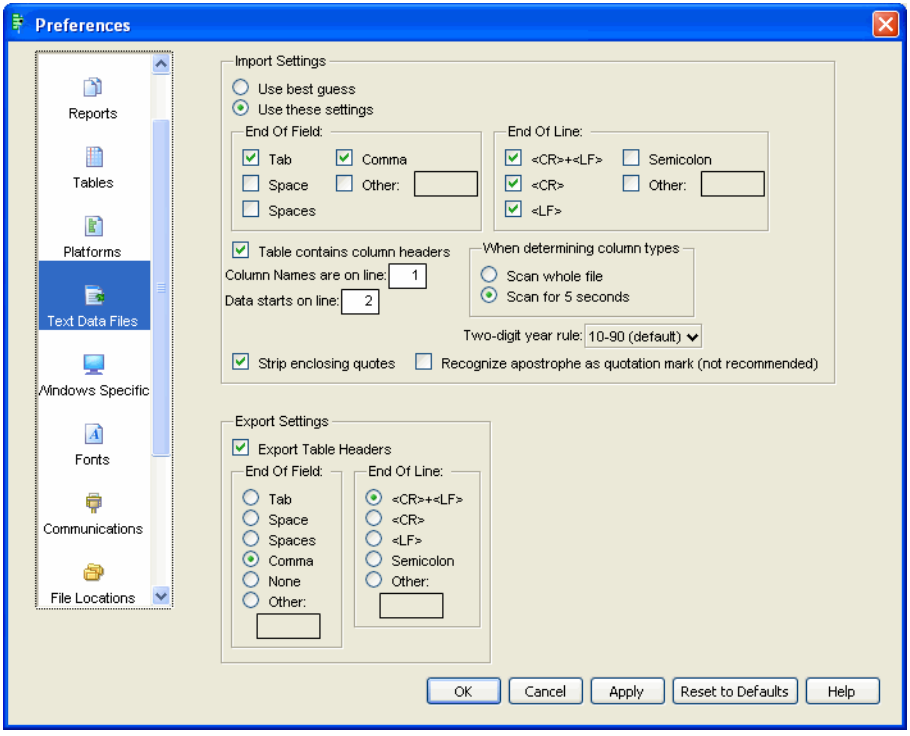
When you import or export text files to and from JMP, it uses the default rules to interpret end of field and end of line delimiters. To change these rules and specify the settings you would like JMP to use when importing and exporting text files:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).

2 Click the **Text Data Files** category, as shown in Figure 10.14.

3 Make your selections, referencing "Opening Text Files," p. 13, for details about available options.

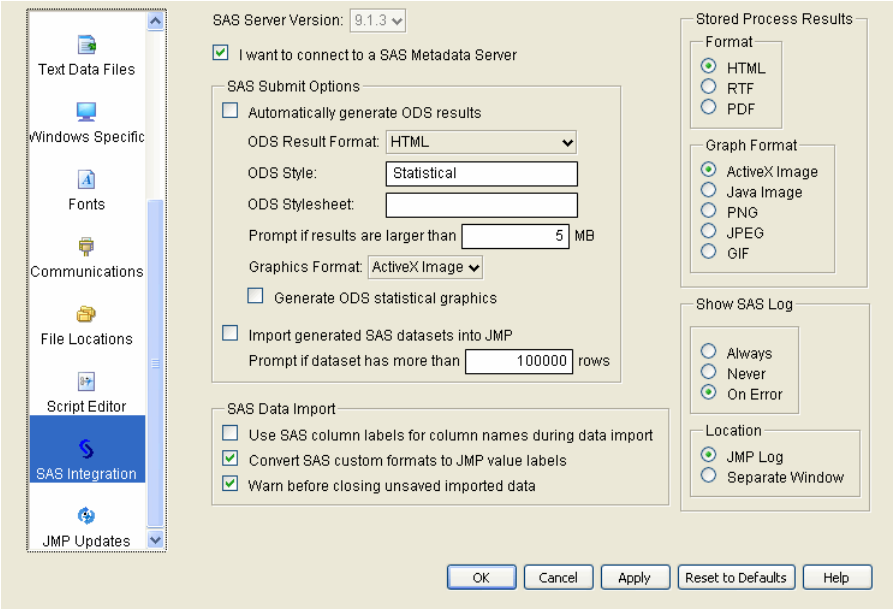
Figure 10.14 The Text Data Files Tab



Specifying Settings for SAS Integration

To change the default settings for working with SAS servers, click the SAS Integration category, as seen in Figure 10.15. For details about using the SAS Integration capabilities, see "SAS Integration," p. 377.

Figure 10.15 SAS Integration Preferences



To set your preferences for connecting to a SAS Metadata Server

- To always connect to a SAS Metadata Server, select **I want to connect to a SAS Metadata Server.**
- If you do not have a SAS metadata server available, and you will be connecting directly to SAS workspace servers instead, uncheck this check box.
- To set the default version for the SAS Server, select either 9.1.3 or 9.2. This can also be changed in the Server Connections window. (See "To connect to a metadata server," p. 379.)

Note: Once you connect to a SAS Metadata Server, the SAS Server Version cannot be changed without quitting and re-starting JMP.

To set your preferences for submitting SAS

Automatically generate ODS results Select this option to generate ODS results.

You can set the **ODS Result Format** (HTML, RTF, PDF), the **ODS Style** (enter the style name), and the **ODS Stylesheet** (enter the style sheet name). You can also set the size of the results (in MB) that triggers a prompt for you to continue or cancel the operation.

Select the Graphics format that is used in the results (ActiveX Image (only available on a Windows-based SAS server), Java Image, PNG, JPEG, GIF), and select whether you want to generate statistical graphics as well.

Import generated SAS data set into JMP Select this to import any generated data sets into JMP automatically. You can also set the size of the table (in rows) that triggers a prompt for you to continue or cancel the operation.

To set your preferences for importing data

Use SAS column labels for column names during data import When importing a SAS data set into a JMP data table, use the column labels in the SAS data set as the JMP data table column names.

Convert SAS column formats to JMP value labels When importing a SAS data set into a JMP data table, use the information in the SAS column formats to set JMP value labels.

Warn before closing unsaved imported data Asks you if you want to save any SAS data sets you've imported into JMP before closing, if you haven't already done so.

To specify formats for your results from stored processes

1 Select a report format: HTML, RTF, or PDF.
2 Select a graph format: ActiveX Image (only available on a Windows-based SAS server), Java Image, PNG, JPEG, or GIF.

To set SAS log options

- Select **Always**, **Never**, or **On Error** to set when the SAS log is displayed.
- Select the location for SAS log information: within the JMP log window, or in a separate SAS log window.

Preserving variable names and formats

SAS variable names and formats can be preserved when exporting data to SAS. To turn these options on or off,

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **Tables** category.
3 Check **Preserve SAS variable names when exporting to SAS** or **Preserve SAS formats when exporting to SAS** to specify your preferences.

Controlling JMP Updates

JMP enables you to configure automatic update checking, telling you when a new version of JMP is available.

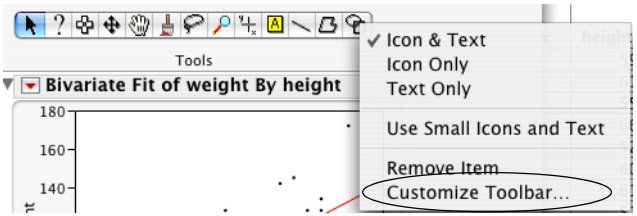
1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Click the **JMP Updates** category.
3 Click the check box beside **Check for Updates** to have JMP automatically check for updates. When checked, you have the option of specifying how often the check is performed.
4 (Optional) If you would like to manually check for a JMP update, click the **Check Now** button.

Personalizing Toolbars (Macintosh)

On the Macintosh, you can add and delete items from the toolbar at the top of JMP report, journal, and layout windows. To personalize toolbars:

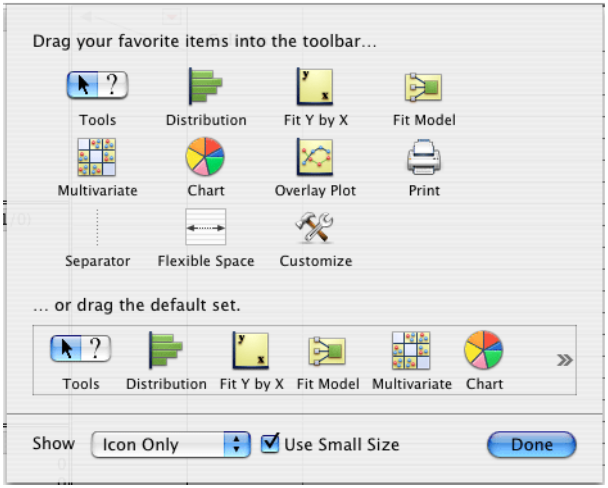
1 Right-click the toolbar and select **Customize Toolbar** from the menu, as shown in Figure 10.16.

Figure 10.16 Personalizing Toolbars



2 The window shown in Figure 10.17 appears. The list in the window contains items that can be dragged from the list into your active toolbar

Figure 10.17 The Customize JMP Toolbar on the Macintosh



Personalizing Toolbars (Windows and Linux)

Under Windows and Linux, there are many ways to personalize toolbars. For example, you can hide or show toolbars, delete or rearrange their buttons, create new bars or new buttons. You can create toolbar buttons for menu items, providing you with an easy way to access these frequently selected items.

You can also eliminate or rearrange the toolbar and then save it for use at any time during a JMP session.

To restore the default toolbar, select **Edit > Customize > Revert to Factory Defaults**.

Showing/Hiding Toolbars

To show or hide toolbars on Windows and Linux:

1 Select **View > Show Toolbars**.
2 Select the toolbars you want to appear in JMP, as shown in Figure 10.18.

Note: To quickly hide and show toolbars on Windows or Linux, right-click a toolbar and select the toolbar to show or hide.

Figure 10.18 Choosing **Show Toolbars** Displays the Show Toolbars Options

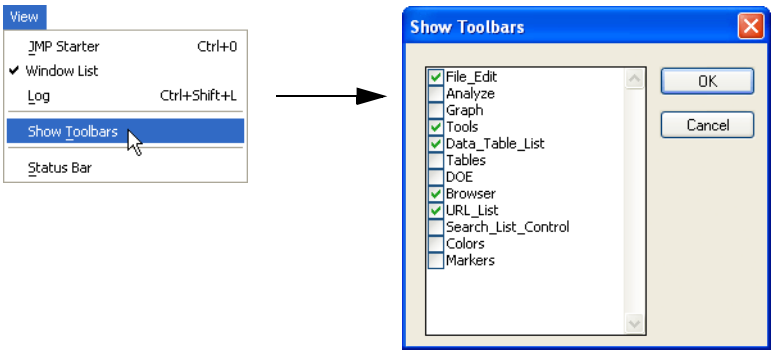


Table 10.2 describes the default JMP toolbars.

Table 10.2 JMP Toolbars

Toolbars in Show Toolbars Window	What Toolbar Contains
File_Edit	Displays a toolbar containing icons for commands found in the **File** and **Edit** menus.
Analyze	Displays a toolbar containing icons for commands found in the **Analyze** menu.
Graph	Displays a toolbar containing icons for commands found in the **Graph** menu.
Tools	Displays a toolbar containing icons of tools you can click and use as your cursor.

Table 10.2 JMP Toolbars (Continued)

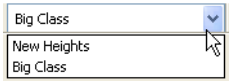
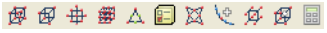
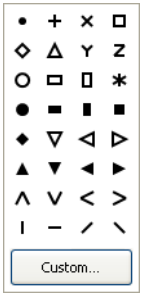
Toolbars in Show Toolbars Window	What Toolbar Contains
Data_Tables_List 	Displays a list of all open data tables. This is useful when you have multiple data tables open. You select a data table in this list to make it the current table. Note that the current table is not necessarily the front window. To bring a table (or any window) to the front, select its name from the list in the **Window** menu.
Tables 	Displays a toolbar containing icons for commands in the **Tables** menu.
DOE 	Displays a toolbar containing icons for commands in the **DOE** menu.
Browser (Windows only) 	Displays standard browser buttons such as forward, backward, and home, to use when an Internet page is open in a browser within JMP. See "Opening a File from the Internet or an Intranet," p. 36, for details.
URL_List (Windows only) 	Lists the browser pages you have requested during the current JMP session. When this toolbar item is open, you can type a URL into the text area to open a new web page in the JMP browser and press the Enter key to access that page. Or, you can select one of the previously visited web pages. See "Opening a File from the Internet or an Intranet," p. 36, for details.
Search_List_Control (Windows only) 	Keeps track of all the data table searches performed on the current data table. When you enter a value in this text area and click the search icon button, the action is the same as using the **Edit > Search > Find** command. Continuous clicks of the **Search** icon button does same as **Edit > Search > Find Next**.

Table 10.2 JMP Toolbars (Continued)

Toolbars in Show Toolbars Window	What Toolbar Contains
Colors (Windows only)	Displays a list of colors available for points in a graph.
Markers (Windows only) 	Displays a list of markers available for points in a graph.
SAS	Displays controls for accessing and browsing SAS data and folders.

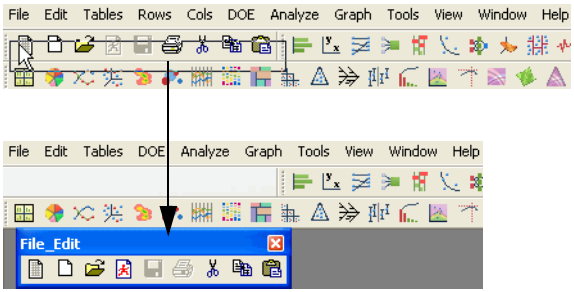
Rearranging Toolbars

Using JMP under Windows and Linux, you can position visible toolbars anywhere. To rearrange toolbars:

1 Click the upper left corner of the toolbar. An outline appears around it.

2 Drag the toolbar to the desired location: either to another location in the toolbar area at the top of the screen or off the toolbar area (as shown in Figure 10.19).

Figure 10.19 Moving the File_Edit Toolbar Off the Toolbar Area


File Edit Tables Rows Cols DOE Analyze Graph Tools View Window Help
File Edit Tables DOE Analyze Graph Tools View Window Help
File_Edit

Tip: To quickly realign the toolbars on Linux, right-click the toolbar and select **Line Up**.

Rearranging Buttons

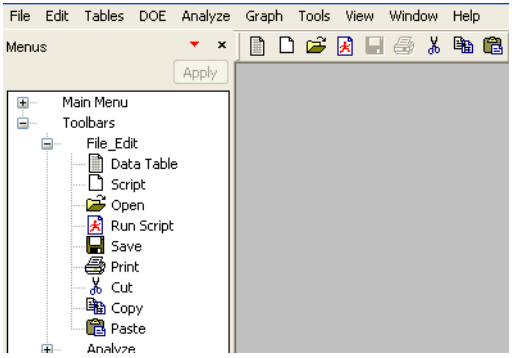
On Windows and Linux, you can rearrange the buttons on any JMP toolbar.

Rearranging Buttons on Windows

On Windows, rearrange buttons on existing toolbars by clicking and dragging as follows:

1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).

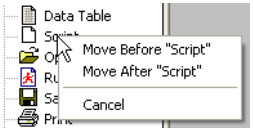
Figure 10.20 Customize Toolbars



2 Click the plus sign to open Toolbars.

3 Click the plus sign to open the specific toolbar you want to customize (for example, **File_Edit**).

4 Click and drag the button near the location you want to move it, and then release the mouse button. A menu appears, prompting you to specify where you want to place the button.



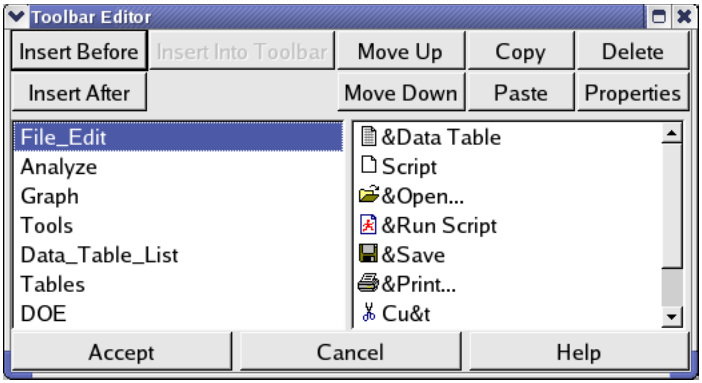
5 Select either **Move Before** or **Move After** to place the button you are moving before or after the highlighted button. Or, select **Cancel** to not move the button.
6 Repeat this for as many buttons as you would like to move.
7 Click **Apply** at the top of the Menus list to apply the change.
8 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Rearranging Buttons on Linux

On Linux, rearrange buttons on existing toolbars by clicking buttons:

1 Select **Edit > Customize > Toolbars**.
2 Highlight the name of the toolbar whose buttons you would like to rearrange. The buttons belonging to the highlighted toolbar appear in the list on the right, as shown in Figure 10.21.

Figure 10.21 Customize Toolbars (Linux)



3 Highlight a button in the list on the right.
4 Click the appropriate button (**Move Up**, **Move Down**, and so on) to rearrange the buttons.

Deleting Toolbars

You can delete a toolbar so it does not appear at the top of the screen under the main menu.

Deleting Toolbars on Windows

To delete toolbars on Windows:

1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).
2 Right-click the name of the toolbar you want to delete, and select **Delete** from the menu.
3 Click **Apply** at the top of the Menus list to apply the change.
4 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Deleting Toolbars on Linux

To delete toolbars on Linux:

1 Select **Edit > Customize > Toolbars**.
2 Highlight the name of the toolbar you would like to delete. The buttons belonging to the highlighted toolbar appear in the list on the right.
3 Click the **Delete** button.

Note: If you accidentally delete the Edit menu and need to come back to the customization feature, right-click an empty area in JMP and select **Customize > Revert to Factory Defaults**.

Deleting Buttons

Deleting Buttons on Windows

To delete toolbar buttons on Windows:

1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).
2 Right-click the name of the button you want to delete, and select **Delete** from the menu.
3 Click **Apply** at the top of the Menus list to apply the change.
4 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Note: If you delete the last button on a toolbar, the entire toolbar is deleted; every toolbar must contain at least one button.

Deleting Buttons on Linux

To delete toolbar buttons on Linux:

1 Select **Edit > Customize > Toolbars**.
2 Highlight the name of the toolbar you would like to delete. The buttons belonging to the highlighted toolbar appear in the list on the right.
3 In the list on the right, highlight the name of the button you would like to delete.
4 Click the **Delete** button.

Adding Toolbars

Adding Toolbars on Windows

To add a new toolbar using JMP on Windows, do the following:

1 Select **Edit > Customize > Menus and Toolbars** to display the Menus list.
2 Right-click a toolbar where you want to add a new one and select **Insert Before** or **Insert After**.

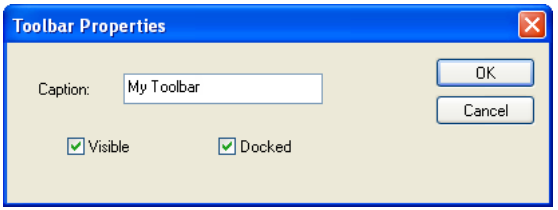
A new, empty toolbar is added to the list named Untitled. (JMP automatically adds a button to any new toolbar, because empty toolbars are not allowed.)

3 To rename the toolbar, double-click it, and in the Toolbar Properties window, type the new name.

4 (Optional) Select whether you want the toolbar to be visible or docked.

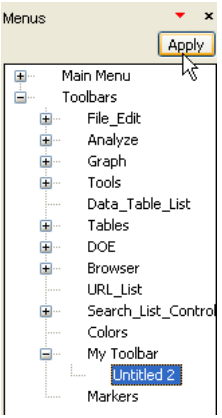
5 Click **OK**.

Figure 10.22 Naming the New Toolbar



6 Click **Apply** at the top of the Menus list to apply the change.

Figure 10.23 Apply the New Toolbar



7 When you close the Menus list, you are prompted to save your changes. Click **Yes**.

You have created your new, empty toolbar. Before you apply your changes, you must add at least one button to the toolbar, as described in "Adding Buttons," p. 362

Adding Toolbars on Linux

To add a new toolbar on Linux, do the following:

1 Select **Edit > Customize > Toolbars**.

2 Highlight a toolbar in the list on the left. Make sure nothing in the list on the right is highlighted.

3 Click **Insert Before** or **Insert After**.

4 To rename the toolbar from Untitled to another name, click **Properties** and change the name. Next, add new buttons to your toolbar as described in "Adding Toolbars on Linux," p. 365.

Adding Buttons

Adding Buttons on Windows

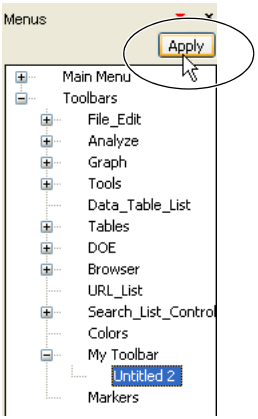
On Windows, create a new button for an existing toolbar by following the steps below:

Step 1: Create a Button

1 Display the Menus list if it is not already showing, by selecting **Edit > Customize > Menus and Toolbars**.

2 Right-click the toolbar where you want to add a button and select **Insert Before** or **Insert After**. An untitled command is added to the toolbar.

Figure 10.24 Apply Changes to Toolbar



3 Click **Apply** at the top of the Menus list to apply the change.

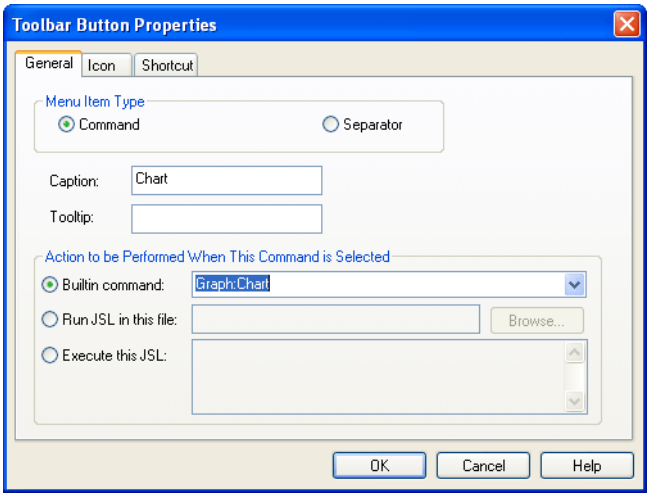
4 When you close the Menus list, you are prompted to save your changes. Click **Yes**.

Note: You can copy a button and paste an exact duplicate of it elsewhere. Right-click on the button and select **Copy**, and then right-click on a button next to which you want to add the copy and select **Paste**. From the menu that appears, select **Copy before** or **Copy after** to place the button.

Step 2: Identify the Button Type

1 Right-click the placeholder toolbar button and select **Properties**. The Properties window appears, as shown in Figure 10.25.

Figure 10.25 The Toolbar Button Properties General Tab



2 Under the **General** tab, select either **Command** or **Separator** to specify whether you want the button to be a command or separator button.

   – Command buttons are the buttons you click to execute a command.

   – Separator buttons ( ) are lines you can add between command buttons to help separate or group them. Separators will not issue any commands and cannot be clicked.

Step 3: Apply a Caption and Tooltip

A caption is the name that you give your toolbar button. A tooltip is the text that appears when you position the cursor over the button. To add a caption and tooltip to your button:

1 Under the **General** tab, type a unique name for the menu in the **Caption** box. You cannot have two or more toolbar buttons with the same name, including the name Untitled.

2 Type a description of the button into the **Tooltip** box. Note that if you do not enter tooltip text in this box, JMP will use the text you enter for the caption as the tooltip text.

Step 4: Assign Button Functionality

When clicked, the toolbar buttons can either execute a predefined command, or it can run a JSL script. Use this table to help you specify what you want a button to do.

Table 10.3 Assigning Actions to Toolbar Buttons

Action	Instructions
Have the toolbar button access an existing JMP command when clicked	1 From the **General** tab, select **Builtin command** from the **Action to be Performed When This Command is Selected** box. 2 Click the drop-down menu and select a command from the list, which contains all platform level commands in JMP, including those that appear in submenus, such as **Nonlinear** or **Partition**.

Table 10.3 Assigning Actions to Toolbar Buttons

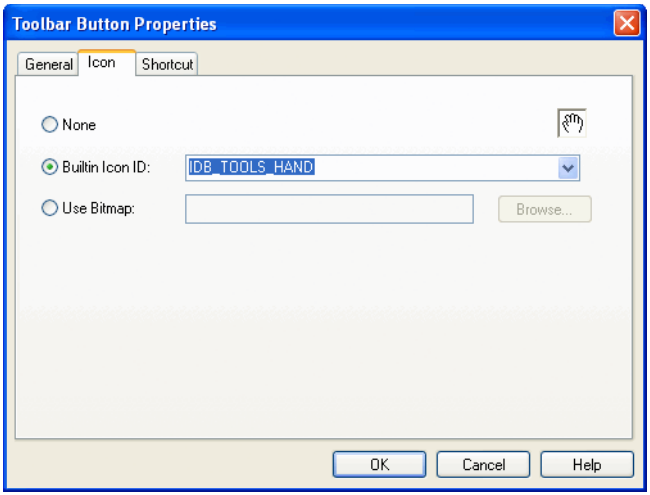
Action	Instructions
Have the toolbar button run a JSL script that is found in a separate file	1 From the **General** tab, select **Run JSL in this file** from the **Action to be Performed When This Command is Selected** box. 2 Click the **Browse** button and specify the path to the file containing the JSL.
Run a JSL script that you type in and save with the button	1 From the **General** tab, select **Execute this JSL** from the **Action to be Performed When This Command is Selected** box. 2 Type in the JSL.

Step 5: Give the Button an Icon

Your button can contain a graphic that indicates what it will do when clicked. This graphic can be a generic one that JMP provides, or it can be any graphic that resides on your computer. To give the button an icon:

1 Click the **Icon** tab in the Toolbar Button Properties window, as shown in Figure 10.26.

Figure 10.26 The Icon Tab



2 Select one of the following:

None Select this option if you do not want the toolbar button to have an icon.

Builtin Icon ID Select this if you want the toolbar button to have an icon that JMP provides. Click the drop-down menu and select an icon ID to assign the button one of the predefined icons.

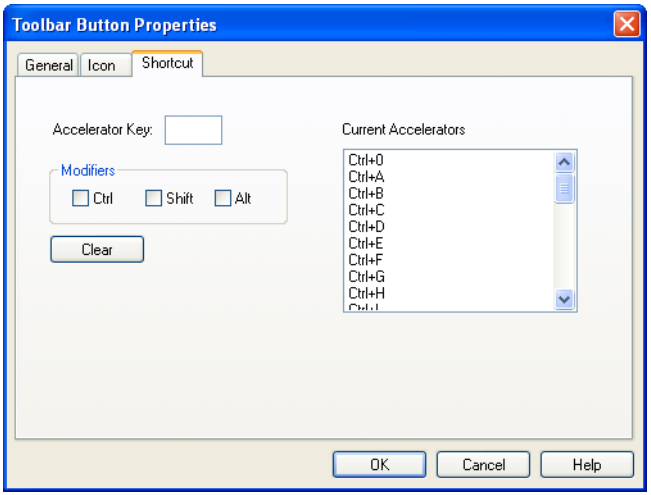
Use Bitmap Select this if you want the toolbar button to have an icon that you have stored as a bitmap (.bmp file) on your computer. Click **Browse** then select the bitmap (.bmp file), and then click **OK**.

Step 6: Assign the Button a Shortcut Key

If you would like, you can give the button a shortcut key so you can access the command by using only the keyboard. To assign a shortcut:

1 Click the **Shortcut** tab in the Toolbar Button Properties window, as shown in Figure 10.27. Note that items in the **Current Accelerators** list are shortcut keys that are already being used in JMP. Therefore, you cannot create a new shortcut using any of the combinations in this list.

Figure 10.27 The Shortcut Tab



2 Type the character portion of the shortcut you are creating in the box beside **Accelerator Key**.

3 In the **Modifiers** area, click the key you would like to include as the modifier portion of the shortcut key you are creating.

4 Click **OK**.

To remove a shortcut from a button's properties, click **Clear**.

Adding Toolbars on Linux

On Linux, create a new button for an existing toolbar by following the steps below:

1 Select **Edit > Customize > Toolbars**.

2 Highlight the toolbar to which you'd like to add a buttons.

3 If the toolbar already contains buttons, highlight a button and click **Insert Before** or **Insert After**. If the toolbar does not contain any buttons, highlight the toolbar name in the list on the left and click **Insert Into Toolbar**.

4 Highlight the newly added button and click **Properties** to identify the button type, apply a caption and tooltip, assign functionality, and give it an icon.

Merging Menus from Earlier Versions (.jmpcmd Files)

On Windows or Linux, you can merge menus from JMP Version 5 or Version 6 as follows:

1. Select **Edit > Customize > Menus and Toolbars** (on Windows) or **Edit > Customize > Merge Menus from Previous Version** (on Linux).
2. On Windows only, the Menus list appears on the left. From the red triangle menu for the Menus list, select **Merge Menus from Previous Versions**.
3. Browse to the folder where your customization file is located. By default, these files have the .jmpcmd extension. Select the file and click **OK**.
4. On Windows only, click **Apply** at the top of the Menus list to apply the change. When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Importing Customized Menus and Toolbars (.jmpmenu Files)

On Windows, you can import customized menus and toolbars from a menu file (.jmpmenu). Any customizations you have made are replaced with the customization in the menu file. On Linux, you can import a .jmpmenu file created on Windows. To import customized menus (on Windows or Linux) and toolbars (Windows only) created in version 7 or later on Windows, do the following:

1. Select **Edit > Customize > Menus and Toolbars** (**Windows**) or **Edit > Customize > Import Additional Menus** (Linux).
2. On Windows only, the Menus list appears on the left. From the red triangle menu for the Menus list, select **Merge Menus from Previous Versions**.
3. Browse to the folder where your customized menus and toolbars file is located. By default, customized menu and toolbars file are named with the file extension .jmpmenu. Select the file, and then click **OK**.
4. On Windows only, click **Apply** at the top of the Menus list to apply the changes. When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Customizing Menus (Windows and Linux Only)

On Windows and Linux, all main menus and their submenus can be rearranged or eliminated from the menu bar. These customized menus can be saved and used anytime during a JMP session.

You can also restore the default menus at any time by selecting **Edit > Customize > Revert to Factory Defaults**.

Figure 10.28 Restoring Default Menus

Rearranging Menu Items

On Windows and Linux, you can rearrange the order that the commands are listed in menus. For example, under the **File** menu, **Open** could be moved to be positioned before **New**.

Furthermore, you can also rearrange the order in which the menus themselves appear in JMP. For example, the **Tables** menu could be moved to appear in the main menu bar on the left of **Edit**.

Rearranging Menu Items on Windows

On Windows, rearrange buttons on existing toolbars by clicking and dragging:

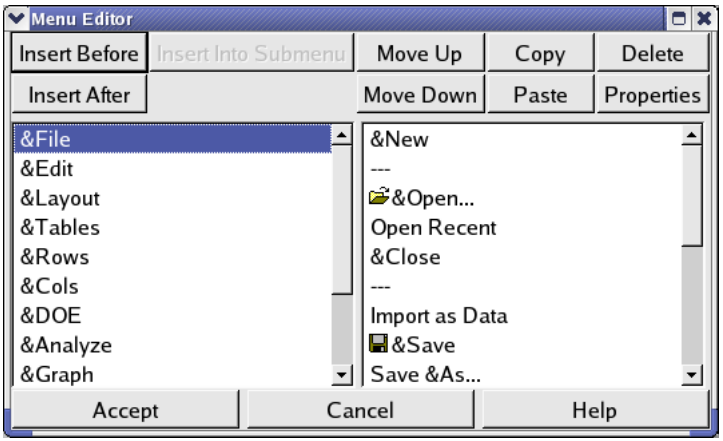
1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).
2 Click the plus sign to open Menus.
3 Click and drag the menu near the location you want to move it, and then release the mouse button. A menu appears, prompting you to specify where you want to place the button.
4 Select either **Move Before** or **Move After** to place the menu you are moving before or after the highlighted menu. Or, select **Cancel** to not move the menu.
5 Repeat this for as many menus as you would like to move.
6 Click **Apply** at the top of the Menus list to apply the change.
7 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Rearranging Menu Items on Linux

On Linux, rearrange menus by clicking buttons:

1 Select **Edit > Customize > Menus**.
2 Highlight the name of the menu whose submenu you would like to rearrange. The submenus belonging to the highlighted menu appear in the list on the right, as shown in Figure 10.29. Note that the ampersand (**&**) represents the shortcut key associated with that command.

Figure 10.29 Customize Menus (Linux)



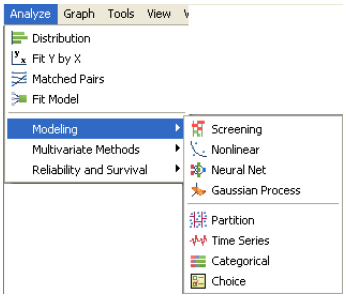
3 Highlight a submenu.

4 Click the appropriate button (**Move Up**, **Move Down**, and so on) to rearrange the buttons.

Example of Rearranging Menu Items

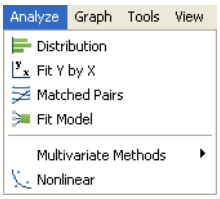
Suppose you are using Windows and want to simplify the **Analyze** menu, shown in Figure 10.30, by eliminating **Survival and Reliability** and **Modeling** but keep **Modeling**'s **Nonlinear** command.

Figure 10.30 The Factory Default Analyze Menu



1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).
2 Click the plus sign to open **Main Menu**.
3 Click the plus sign to open **Analyze**.
4 Click **Survival and Reliability** and select **Delete**.
5 Click **Yes** when asked if you're sure you want to delete the menu.
6 Click the plus sign to open **Modeling**.
7 Click and drag **Nonlinear** and release the mouse button on top of the Multivariate Methods menu.
8 From the menu, select **Move After "Multivariate Methods"**.
9 Click **Modeling** and select **Delete**.
10 Click **Yes** when asked if you're sure you want to delete the menu.
11 Click **Apply** at the top of the Menus list to apply the change.

Figure 10.31 The Rearranged Analyze Menu



12 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Deleting Menus

Deleting Menus on Windows

On Windows, you can delete an entire menu, or you can delete submenus. To delete:

1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).
2 Click the plus sign to open **Main Menu**.
3 Right-click the menu name (such as **File**, **Edit**, **Tables**, and so on) or a submenu name (such as **New**, **Open**, **Save**, and so on) you would like to delete.
4 Select **Delete**.
5 Click **Yes** when asked if you're sure you want to delete the menu.
6 Click **Apply** at the top of the Menus list to apply the change.
7 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Note: If you delete the last item in a menu, the entire menu is deleted; every menu must contain at least one item.

Deleting Menus on Linux

To delete menus on Linux:

1 Select **Edit > Customize > Menus**.
2 Highlight the name of the menu you would like to delete. The submenus belonging to the highlighted menu appear in the list on the right.
3 To delete a menu, make sure nothing is highlighted in the list on the right and click **Delete**.
To delete a submenu, highlight the name of the button you would like to delete in the list on the right and click **Delete**.

Adding Menus

Adding Menus on Windows

On Windows, you can create your own menu and add it to the main menu bar in JMP:

1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).
2 Right-click a menu next to which you want to add a new menu.
3 Select **Insert Before** or **Insert After**.
A new, empty menu is added to the list named Untitled.
4 To rename the menu, double-click it. In the window that appears, enter the new name and click **OK**.
5 Click **Apply** at the top of the Menus list to apply the change.
6 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

You can now build the menu by adding menu items, as described in "Adding Menu Items," p. 370.

Adding Menus on Linux

To add a new menu on Linux:

1 Select **Edit > Customize > Menus**.
2 Highlight a menu in the list on the left. Make sure nothing in the list on the right is highlighted.
3 Click **Insert Before** or **Insert After**.
4 Rename the menu from Untitled to something else by clicking **Properties**.

Adding Menu Items

Adding Menu Items on Windows

On Windows, you create a new menu item for an existing menu by following the steps below:

Step 1: Create a Menu Item

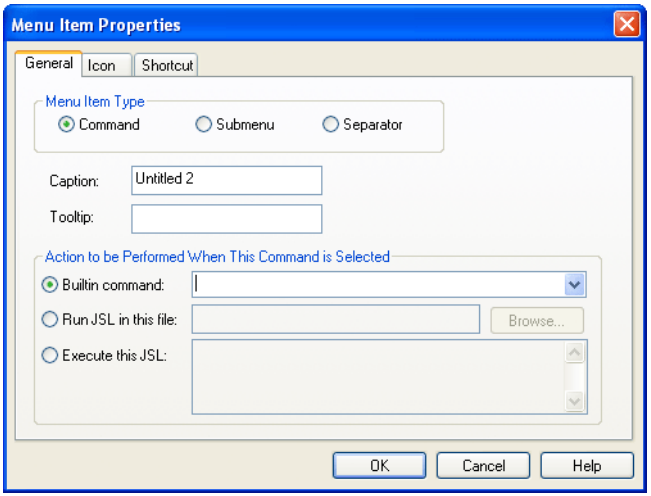
1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left (Figure 10.20).
2 Right-click the menu to which you want to add a menu item. (JMP automatically adds a command placeholder to any new menu, because empty menus are not allowed.)
3 Click **Apply** at the top of the Menus list to apply the change.
4 When you close the Menus list, you are prompted to save your changes. Click **Yes** to save them, or **No** to discard them.

Note: You can copy a button and paste an exact duplicate of it elsewhere. Right-click on the button and select **Copy**, and then right-click on a button next to which you want to add the copy and select **Paste**. From the menu that appears, select **Copy before** or **Copy after** to place the button.

Step 2: Identify the Menu Type

1 Right-click the placeholder menu item and select **Properties**. The Properties window appears, as shown in Figure 10.32.

Figure 10.32 The Menu Item Properties General Tab



2 Under the **General** tab, select either **Command**, **Submenu**, or **Separator**.

- Command menu items are the items you click to execute a command.
- Submenu items are menu items that you click to reveal more menu options. An example of a menu item that is of the submenu type is the **File** menu item. Also, within the file menu, **New** is a submenu item because it also contains other menu items.
- Separator menu items (———) are lines you can add between menu items to help separate or group them. Separators will not issue any commands and cannot be clicked.

Step 3: Apply a Caption

A caption is the name that you give your menu item. It is the name that will appear in the main menu. To give the menu item a caption, type a unique name for the menu in the **Caption** box under the **General** tab. You cannot have two or more menu items with the same name, including the name Untitled.

Note: You cannot apply captions to separator menu items.

Step 4: Assign Menu Item Functionality

When selected, menu items can either execute a predefined command, or it can run a JSL script.

Use the table below to specify what you want your command menu item to do:

Table 10.4 Assigning Actions to Menu Items

Action	Instructions
Have the menu item access an existing JMP command when clicked	1 From the **General** tab, select **Builtin command** from the **Action to be Performed When This Command is Selected** box. 2 Click the drop-down menu and select a command from the list, which contains all platform level commands in JMP, including those that appear in submenus, such as **Nonlinear** or **Partition**.

Table 10.4 Assigning Actions to Menu Items

Action	Instructions
Have the menu item run a JSL script that is found in a separate file	1 From the **General** tab, select **Run JSL in this file** from the **Action to be Performed When This Command is Selected** box. 2 Click the **Browse** button and specify the path to the file containing the JSL.
Run a JSL script that you type in and save with the menu item	1 From the **General** tab, select **Execute this JSL** from the **Action to be Performed When This Command is Selected** box. 2 Type in the JSL.

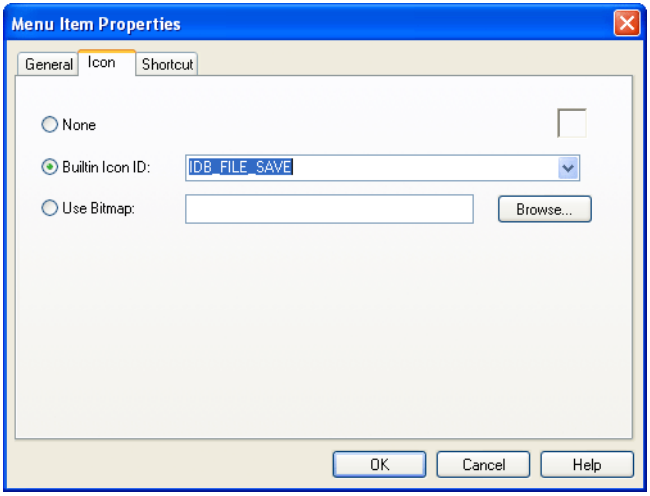
Step 5: Give the Menu Item an Icon

Your menu item can contain a graphic that indicates what it will do when selected. This graphic will be placed on the left side of the menu item in its menu.

To give the menu item an icon:

1 Click the **Icon** tab in the Menu Item Properties window, as shown in Figure 10.33.

Figure 10.33 The Icon Tab



2 Select from the following options:

None Select this option if you do not want the menu item to have an icon.

Builtin Icon ID Select this if you want the menu item to have an icon that JMP provides. Click the drop-down menu and select an icon ID to assign the menu item one of the predefined icons.

Use Bitmap Select this if you want the menu item to have an icon that you have stored as a bitmap (.bmp) on your computer. Click **Browse**, select your bitmap, and then click **OK**.

Step 6: Assign the Menu Item a Shortcut Key

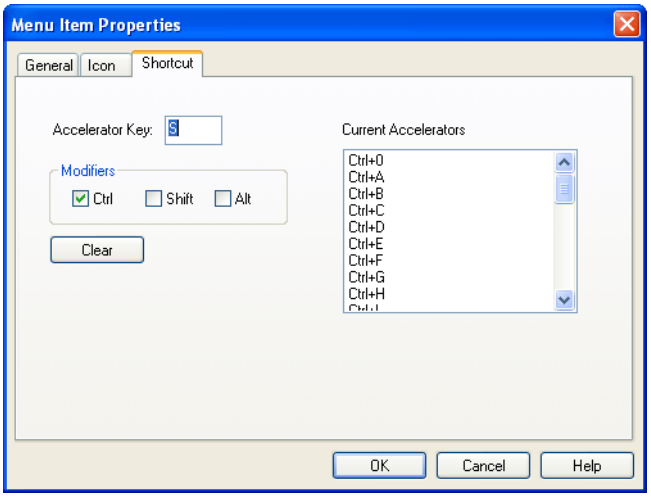
You might want to give a menu item a shortcut key so you can access it by using only the keyboard.

To assign a shortcut:

1 Click the **Shortcut** tab in the Menu Item Properties window, as shown in Figure 10.27. Note that items in the **Current Accelerators** list are shortcut keys that are already being used in JMP.

Therefore, you cannot create a new shortcut key using any of the combinations in this list.

Figure 10.34 Adding Shortcuts to a Menu Item



2 Type the character portion of the shortcut key you are creating in the box beside **Accelerator Key**.
3 In the **Modifiers** area, click the key you would like to include as the modifier portion of the shortcut key you are creating.
4 Click **OK**.

To remove a shortcut from a menu item's properties, click **Clear**.

Adding Menu Items on Linux

On Linux, create a new menu item by following the steps below:

1 Select **Edit > Customize > Toolbars**.
2 Highlight the menu to which you'd like to add an item.
3 If the menu already contains items, highlight an item and click **Insert Before** or **Insert After**.
If the menu does not contain any items, highlight the menu name in the list on the left and click **Insert Into Submenu**.
4 Highlight the newly added item and click **Properties** to identify the menu type, apply a caption and tooltip, assign functionality, give it an icon and assign it a shortcut key.

Renaming Menu Items

Menu names are the text you see on menu items, such as **New**, **Open**, and **Save**. On Windows and Linux, you can change these names to your preference.

Renaming Menu Items on Windows

To rename menu items on Windows:

1 Select **Edit > Customize > Menus and Toolbars**. The Menus list appears on the left

(Figure 10.20).

2 Right-click the menu name (such as **File**, **Edit**, **Tables**, and so on) or open the menu to display the submenus and click the submenu name (such as **New**, **Open**, **Save**, and so on) you would like to rename.
3 Select **Properties**.
4 Type a new name for the submenu in the **Caption** box. You cannot have two or more submenus with the same name.
5 Click **OK**, and your menu system will reflect the change.

Renaming Menu Items on Linux

To rename menu items on Linux:

1 Select **Edit > Customize > Toolbars**.
2 Highlight the menu you'd like to rename.
3 Click **Properties**.

Saving Menus and Toolbars (Windows and Linux)

On Windows and Linux, JMP saves customized menu and toolbar configurations in a file with the extension .jmpmenu on Windows or .jmpcmd on Linux. On Windows, this file is usually located in the user's local application data folder. On Linux, this file is usually located in the user's home directory in the .jmp folder.

You can select **Edit > Customize > Revert to Factory Defaults** at any time to restore the factory default main menu and toolbars. When you do, a backup copy of your customized configuration is saved.

Using a Separate Customized File (Windows)

If you do not want to alter the menu and toolbar settings that appear on startup by default, you can store your customized settings in a separate file, such as one named mymenus.jmpmenu. If you do not apply the changes, the settings will not appear when you start JMP. To view them after saving you must open the file from within JMP.

The sections below describe how to create the file, and then how to open and close the file.

Creating the Customized File

1 Select **Edit > Customize > Menus and Toolbars**.
2 Customize your menus or toolbars.
3 From the red triangle menu, select **Export Main Menu and Toolbar List**.
4 Type a new name for the file and save it.
5 Close the Menus list without applying the changes.

Your menus and toolbars are the same as they were before you saved the .jmpmenu file, but that file contains your custom menus and toolbars, which you can share with other JMP users, or load and use yourself at any time.

Using a Customized File

After you have created a new .jmpmenu file, you can use it at any time during a JMP session.

To load the customized menu file:

1 Select **Edit > Customize > Menus and Toolbars**.
2 From the red triangle menu, select **Import Menu Archive**.
3 Select the filename and click **Open**.
4 Click **Apply**.
5 Close the Menus window and click **Yes** when asked if you want to save your changes.

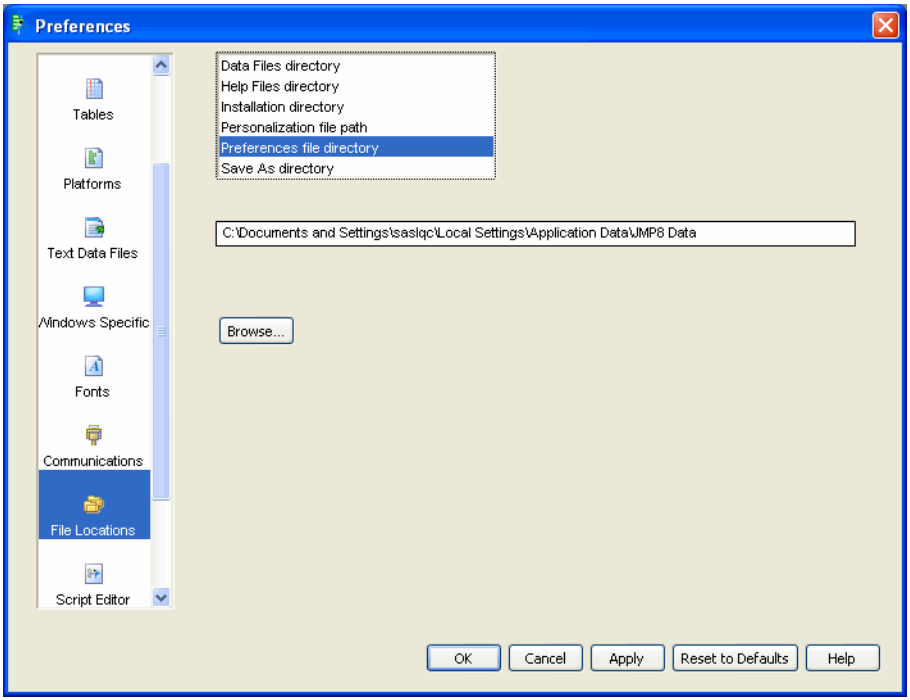
Changing the Default Location of .jmpmenu File (Windows)

You might want to change the default location where JMP stores the .jmpmenu files on Windows. The original default location is the same folder as where the JMP application is stored.

To change the default location:

1 Select **File > Preferences**.
2 Click the **File Locations** category.
3 Select **Preferences file directory**. The current default location appears in the box above **Browse**, as shown in Figure 10.35.

Figure 10.35 The File Location Category



4 Change the location by typing into the field or clicking **Browse**, navigating to the directory, and clicking **Select**.

5 Click **OK**.

6 If you click **Yes** when asked if you want to save your current settings into this new directory, JMP will both change the default location and overwrite the existing file in that directory with the current toolbar and menu settings. If you click **No**, your current menu and toolbar settings will not be saved into this directory. The next time you start JMP, toolbar and menu settings will be taken from your newly specified location.

Chapter 11

SAS Integration

Working with SAS data from JMP

You can connect to a SAS server and work directly with SAS data sets:

- Import whole SAS data sets or portions of data sets
- Make changes to imported SAS data in JMP and then export those changes as a SAS data set
- Run stored processes
- Submit SAS code from JMP

Access SAS options from the **File > SAS** menu:

Browse Data Browse and import data residing on a SAS Server.

Browse SAS Folders Browse and run SAS stored processes or open Metadata-defined data tables.

SAS Add-ins Opens a window with links to additional JSL/SAS programs available.

New SAS Program Opens a script window for writing and submitting SAS code.

Open SAS Log Window Opens a SAS log window for the active SAS server.

Open SAS Output Window Opens a SAS output window for the active SAS server. This window shows recent SAS output.

Server Connections Administer connections to SAS servers.

You can also find shortcuts for SAS options on the SAS page of the JMP Starter, and there is a SAS toolbar. You can save certain settings pertaining to SAS Integration on the SAS Integration page of the Preferences window (**File > Preferences**). For more information about setting your SAS Integration preferences, see "Specifying Settings for SAS Integration," p. 351 in the "Personalizing JMP" chapter.

Contents

Connecting to SAS 379
Connect to a SAS Metadata Server 379
Connect to a SAS Server on a Remote Machine 382
Connect to SAS on Your Local Machine (Windows Only) 383
Opening SAS Data Sets 383
Browsing SAS Data Information 384
Open a SAS Data Set in JMP 386
Running Stored Processes 390
Submitting SAS Code 391
Generating ODS Results 393
Retrieving Generated SAS Data Sets 394

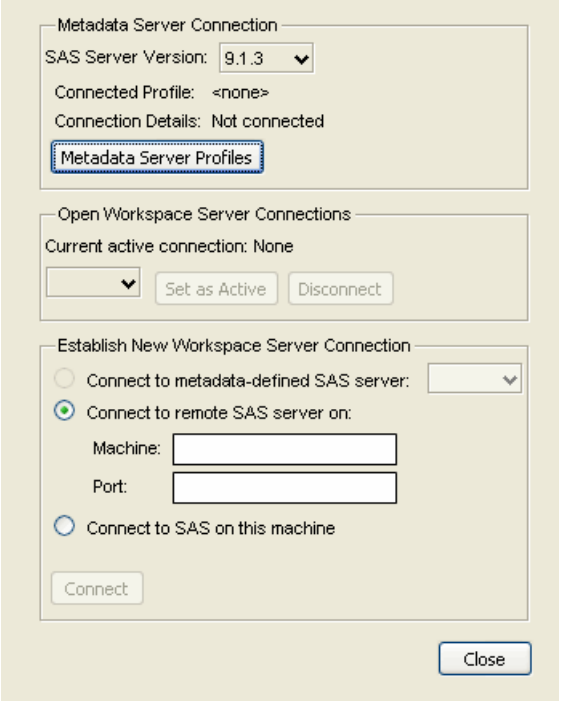
Connecting to SAS

You can either connect to a SAS metadata server or directly to a SAS workspace server. Once connected to a SAS metadata server, you can browse through SAS servers, libraries, and data sets.

Note: The earliest supported release of the SAS metadata server is version 9.1.3 SP4. Connections to earlier releases of the SAS metadata server are experimental and are not supported.

To connect to a SAS server, click **File > SAS > Server Connections**. The SAS Server Connections window in Figure 11.1 appears. All connections are made in this window.

Figure 11.1 SAS Server Connection Window



Connect to a SAS Metadata Server

Note: You can be connected to only one metadata server at a time. If you make a second connection, your first one is disconnected for you.

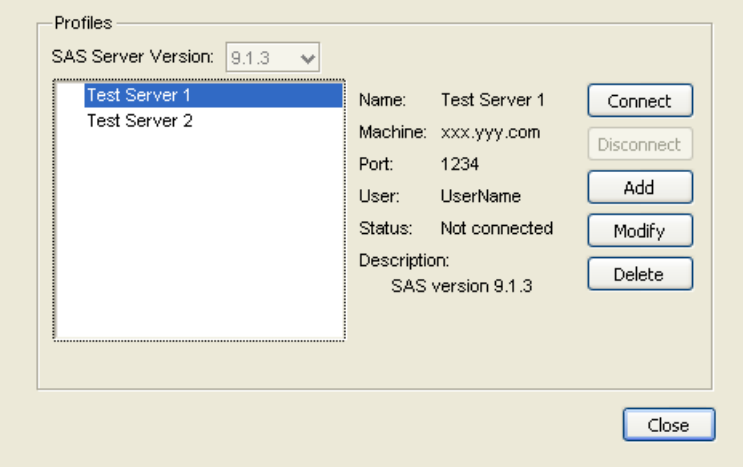
To connect to a metadata server

1 Select the version for the SAS Server. Your SAS metadata server administrator should have this information.

2 Click **Metadata Server Profiles**.

The **Manage Metadata Server Profiles** window in Figure 11.2 appears.

Figure 11.2 Metadata Server Connection



3 Select a profile in the list.

Note: If you need to add a profile, see "To create or modify a metadata server profile," p. 381.

4 Click **Connect**.

If a connection is established, the Status information changes to **Connected**. If JMP is unable to establish a connection, an error message will give you the reason. Common reasons are invalid user names or passwords. If you need to update the information for the profile, see "To create or modify a metadata server profile," p. 381.

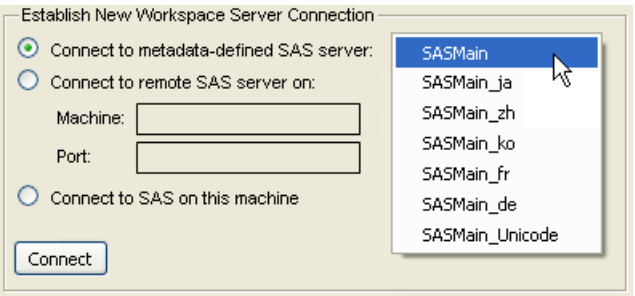
5 Click **Close**.

Once you are connected to a SAS Metadata Server, you can connect to any SAS Workspace Servers that the Metadata Server offers.

To connect to a SAS Workspace Server

1 In the SAS Server Connections window, select the workspace server to connect to. (See Figure 11.3.)

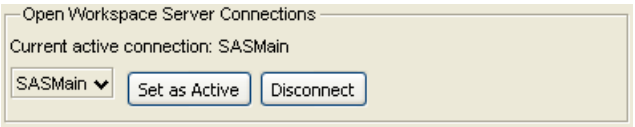
Figure 11.3 Open a connection to a Workspace Server



2 Click **Connect**.

Under Open Workspace Server Connections, the workspace server is shown as the current active connection. See Figure 11.4.

Figure 11.4 Current Active Connection



3 Click **Close**.

To change the active connection

Note: The active connection is what is used to submit SAS code or handle SAS script commands.

To change the active connection, you first need to be connected to more than one server. Follow the instructions in "To connect to a SAS Workspace Server," p. 380 to add two or more server connections.

1 In the Open Workspace Server Connections section, click the drop-down menu and select the desired server.
2 Click **Set as Active**.
3 Click **Close**.

Tip: You can change the active server at any time.

To disconnect from a workspace server

1 In the SAS Server Connections window, select the workspace server to disconnect under Open Workspace Server Connections.
2 Click **Disconnect**.

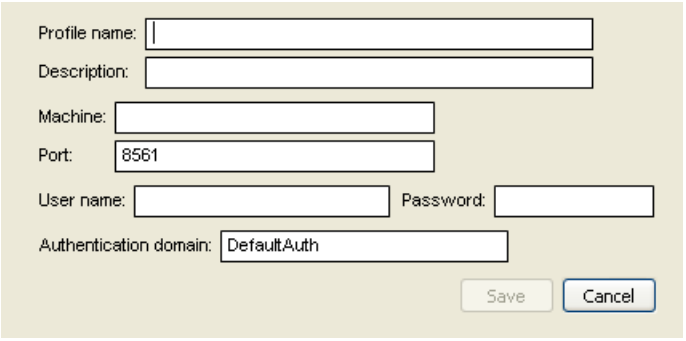
To disconnect from the metadata server

1 In the SAS Server Connections window, click **Metadata Server Profiles**.
2 Select the Metadata Server you're connected to.
3 Click **Disconnect**.

To create or modify a metadata server profile

1 In the SAS Server Connections window, select the **SAS Server Version**.
2 Click **Metadata Server Profiles**.
3 Click **Add** to add a new profile, or click **Modify** to change a profile's settings.
The Create Profile or Modify Profile window appears. If you are adding a new one, all fields are empty except the Authentication domain field, which contains DefaultAuth. If you are modifying a profile, the fields contain the current information.

Figure 11.5 Create or Modify a Metadata Server Profile



4 Fill in the information needed to connect to a SAS metadata server. Your SAS metadata server administrator should have this information.

Profile name Select a name for this profile. The name will appear in the list of profiles.

Description (Optional) You can enter a short description of this profile.

Machine The name of the machine that hosts the metadata server. (Example: myserver.mycompany.com)

Port The port through which you should connect to the machine. (Example: 8561)

User name Your user name for the metadata server.

Password Your password. This is always displayed as asterisks.

Authentication domain The domain you, as a user, belong to.

5 Click **Save**.

Connect to a SAS Server on a Remote Machine

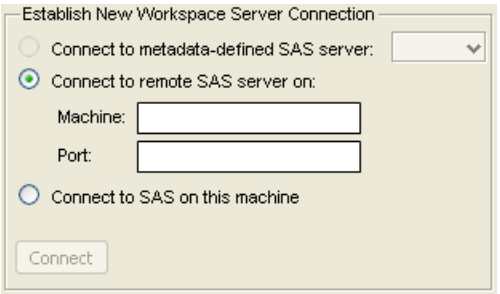
You can also connect directly to a SAS workspace server, instead of going through a metadata server.

To connect to a SAS server

1 Open the SAS Server Connections window (**File > SAS > Server Connections**).

2 Under Establish New Workspace Server Connection, select **Connect to remote SAS server on**.

Figure 11.6 Open a Connection to a Remote SAS Server

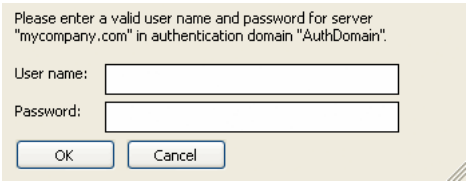


3 Enter the machine name and the port number. Your SAS server administrator has this information.

4 Click **Connect**.

The **JMP: Connect to SAS Server** window appears. See Figure 11.7.

Figure 11.7 Connect to SAS Server


Please enter a valid user name and password for server "mycompany.com" in authentication domain "AuthDomain".
User name:
Password:
OK
Cancel

5 Enter your user name and password.

6 Click **OK**.

7 Click **Close** in the SAS Server Connections window.

To disconnect from a SAS server

1 In the SAS Server Connections window, select the server to disconnect under Open Workspace Server Connections.

2 Click **Disconnect**.

Connect to SAS on Your Local Machine (Windows Only)

You can also connect directly to SAS on your local machine.

To connect to SAS on your computer

1 Open the SAS Server Connections window (**File > SAS > Server Connections**).

2 Under Establish New Connection, select **Connect to SAS on this machine**.

3 Click **Connect**.

4 Click **Close** in the SAS Server Connections window.

To disconnect from SAS on your computer

1 In the SAS Server Connections window, select **Local** under Open Connections.

2 Click **Disconnect**.

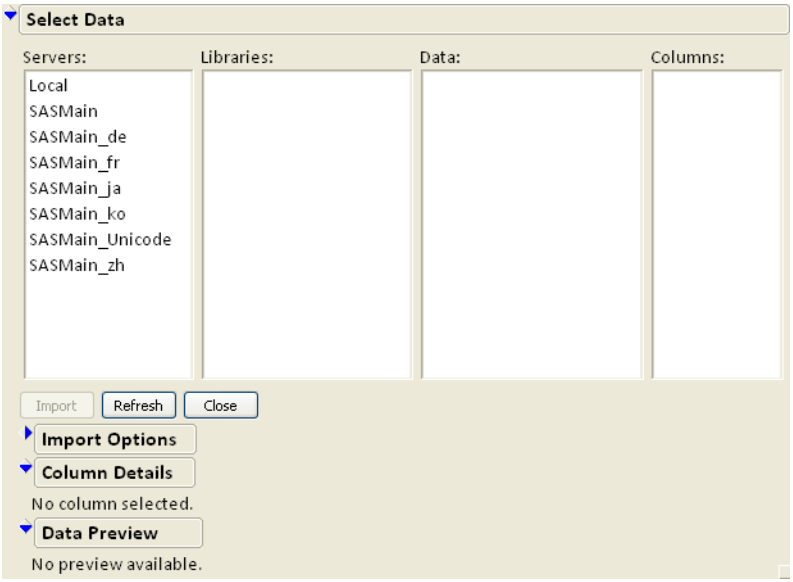
Opening SAS Data Sets

Once you have a connection to a SAS workspace server, you can browse through the SAS libraries on that server and import data into JMP.

Tip: You can open a SAS data set either through **File > Open**, or through **File > SAS > Browse SAS Data**. To open a SAS data set using **File > Open**, you do not even need to be connected to a SAS server.

To browse the available SAS data, select **File > SAS > Browse Data**. The Browse SAS Data window appears. See Figure 11.8.

Figure 11.8 Browse SAS Data



The window is initially populated with a list of servers the SAS metadata server provides (if connected). Any physical and local connections are also shown (as listed in Figure 11.6 "Open a Connection to a Remote SAS Server," p. 382).

- Select a server to see a list of libraries that server contains.
- Select a library to see a list of data sets within that library.
- Select a data set to see a list of columns within that data set.

At any time, you can select a different data set, library, or server.

Tip: If a server is unavailable, or if the connections failed, the server's name is shown in light, italic text. Click it to try to re-establish the connection.

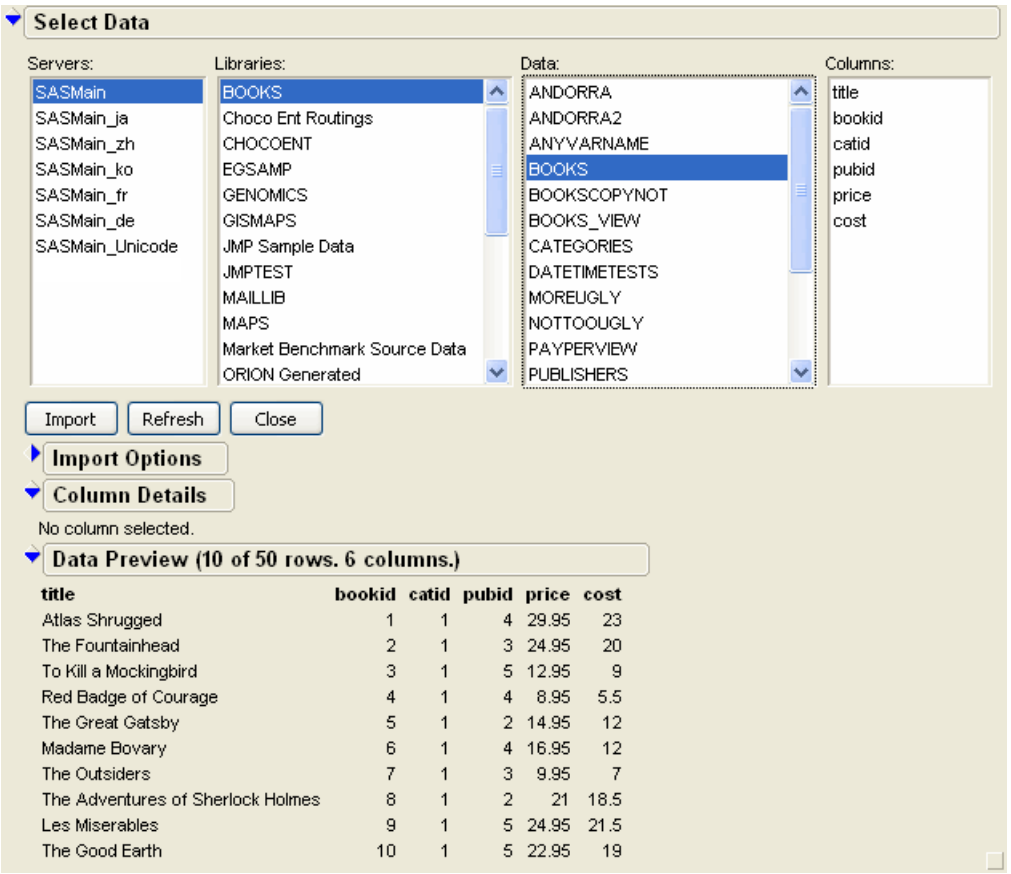
Browsing SAS Data Information

You can select a SAS data set and see information about its contents before opening it using Column Details and Data Preview.

Data Preview

When you select a data set, the Data Preview outline shows you the first ten rows and columns in the data set. See Figure 11.9.

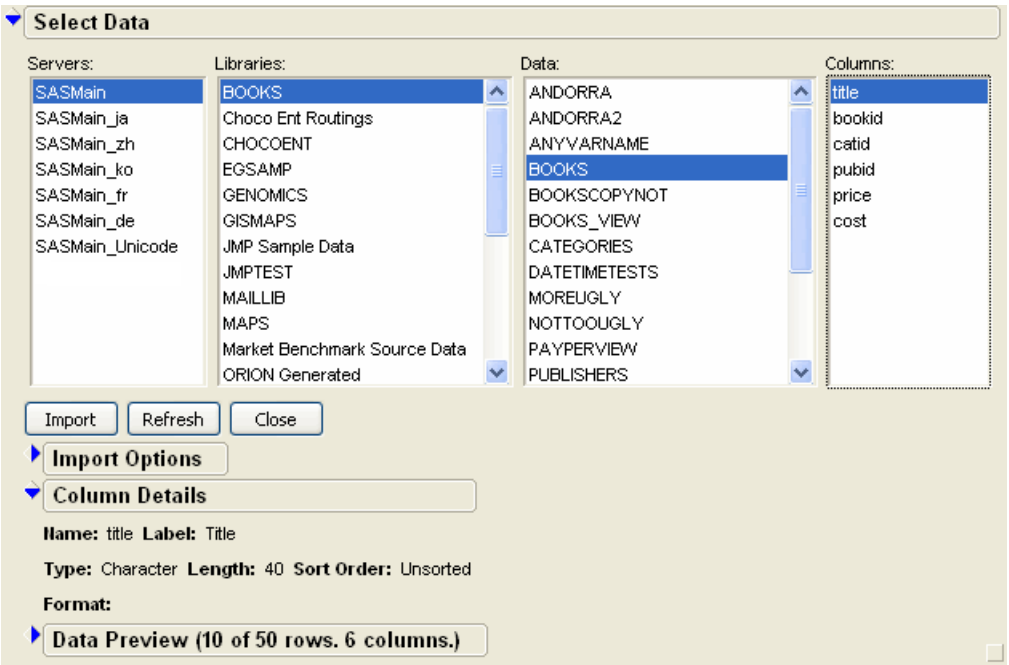
Figure 11.9 Data Preview



Column Details

To see information about a particular column in the data set, select it. The Column Details outline shows you some basic information about the data column. See Figure 11.10.

Figure 11.10 Column Details



Name Column name from the SAS data set.

Label Descriptive column label. The label can be longer than the name, and is often helpful to determine what the column name means.

Type Specifies whether the column has a character or numeric data type.

Length The length in bytes of data in the column.

Sort Order How the column is sorted in SAS.

Format The format for the SAS column, such as DOLLAR. This format field also contains information about the width of formatted values and the number of decimal places.

Open a SAS Data Set in JMP

You can import SAS data sets directly into JMP.

1 Select a data set.
2 Click **Import**.

The SAS data set is imported into a JMP data table. When SAS data is imported, JMP attempts to make the best match to the SAS format.

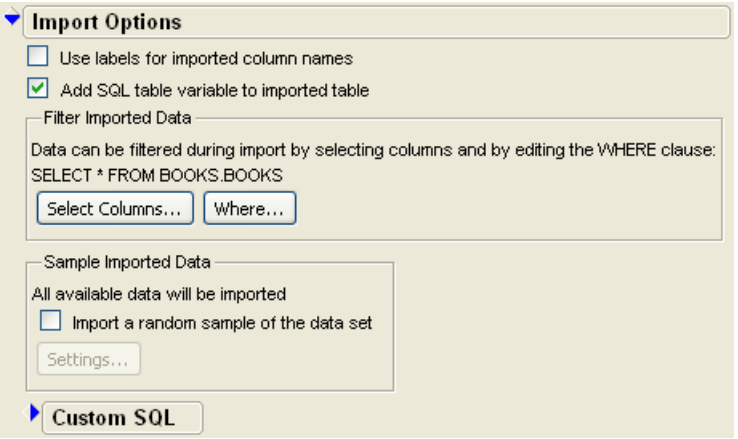
If you only want to import a portion of a data set, you do any of the following:

- Select a subset of the columns ().
- Construct a WHERE clause to filter the data ().
- Take a random sample of the data.

To select a subset of columns

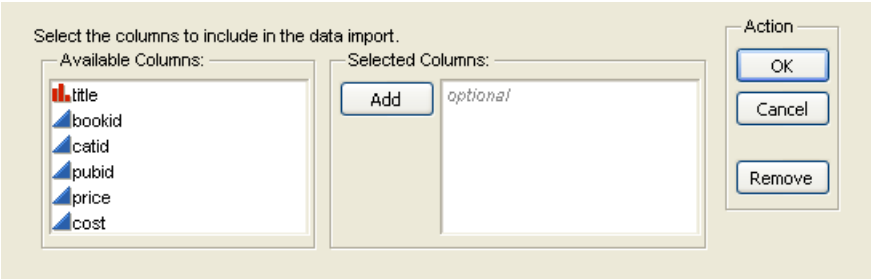
1 Open the Import Options outline. See Figure 11.11.

Figure 11.11 Import Options


Import Options
Use labels for imported column names
Add SQL table variable to imported table
Filter Imported Data
Data can be filtered during import by selecting columns and by editing the WHERE clause:
SELECT * FROM BOOKS.BOOKS
Select Columns...
Where...
Sample Imported Data
All available data will be imported
Import a random sample of the data set
Settings...
Custom SQL

2 Click **Select Columns**.
The Select Columns window appears. See Figure 11.12.

Figure 11.12 Select Columns



3 Select the columns you want to import.
To select more than one column at a time, Control-click (Windows and Linux) or ⌘-click (Macintosh) each column.

4 Click **Add**.

5 When you have added all the columns you want, click **OK**.

6 In the Browse SAS Data window, click **Import**.

Only the columns you selected from the SAS data set are imported into a JMP data table.

To import using a WHERE clause

1 Click **Where**.

2 Use the WHERE clause editor to construct your WHERE clause.

3 Click **OK** to return to the Browse SAS Data window.

4 Click **Import**.

Only the data that matches your WHERE clause are imported into a JMP data table.

For information about constructing WHERE clauses and using the WHERE clause editor, see "Using the WHERE Clause Editor," p. 33.

Note: If you import data using both a WHERE clause and sampling, the WHERE clause is applied first, and then a sample of the filtered data is taken.

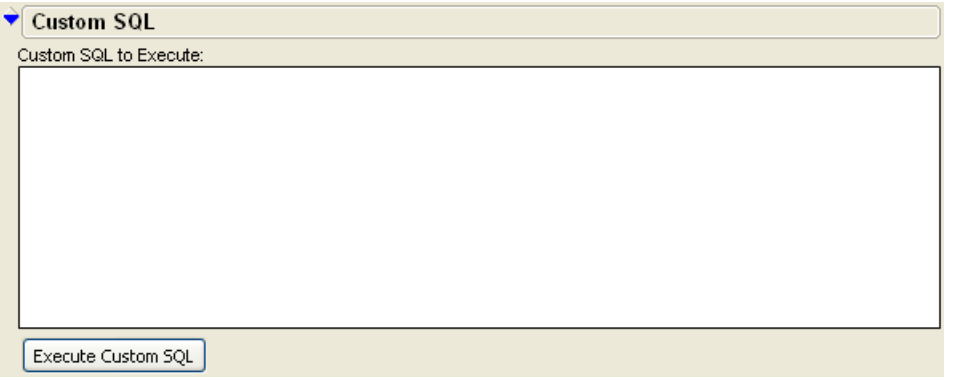
You can also write your own SQL statements.

Custom SQL

You can also open a SAS data set using a custom SQL statement.

1 Open the Custom SQL outline under the Import Options outline. See Figure 11.11.

Figure 11.13 Custom SQL



2 Enter your SQL statement in the window.

3 Click **Execute Custom SQL**.

Note: Your SQL is run on the selected server but is not restricted to any selected library or data set.

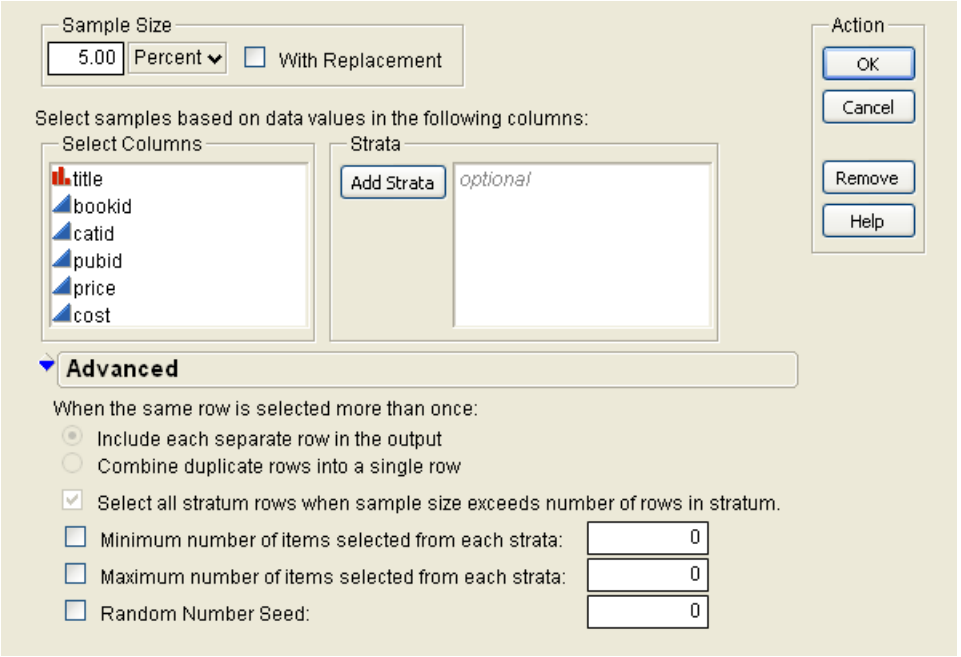
Importing a random sample of the data

You can also import a random sample of the rows of the SAS data set.

Note: The sampling feature requires that the SAS server has the SAS/STAT product licensed and installed. If SAS/STAT is not present, sampling is disabled.

In the Sample Imported Data area of the Import Options outline, select the **Import a random sample of the data set** check box. By default, 5% of the rows will be imported. To change the random sample import settings, click the **Settings** button.

Figure 11.14 Sampling Settings



In this window, you specify any of the following:

Sample Size You can set the sample size be percentage or by number of rows. To ensure that each row is sampled only once, de-select the **With Replacement** option. To ensure that any row can be sampled and appear more than once in the imported data, select the option.

Selecting by Column You can select strata by moving columns into the Strata list.

Handling Multiple Row Sampling If With replacement is selected, you can specify to either add each duplicated row as a separate row or combine all duplicated rows into one row. If the second option is selected, a column is added to the table that contains a count of how many times each row was sampled.

Setting minimum and maximum numbers of items selected Select the option and enter a number.

Setting the random number seed Select the option and enter a seed. Specifying the seed lets you reproduce the exact same sample multiple times.

Note: If you import data using both a WHERE clause and sampling, the WHERE clause is applied first, and then a sample of the filtered data is taken.

Import Options

There are additional options you can use to specify how SAS data is imported into JMP.

Use labels for imported column names When selected, this option switches the column name, which has a limited length and might be difficult to decipher, with the column label. This option

is turned on by default. To use the SAS data column names as column names in JMP, uncheck this box.

Add SQL table variable to imported table When selected, this option adds SQL queries to the data table panel. This option is turned on by default. If you turn off this option, when you import the data table, you will have only two variables: the SAS server and the data set.

Tip: If your data is password-protected, you might want to turn this option off, because your password might be shown in the SQL.

Table variables

After you import the JMP data table, table variables appear in the upper left panel of the data table. These variables show the SAS server, data set, and the SQL query and sampling settings if applicable. There is also a source script added that lets you re-do the import at any time.

Running Stored Processes

Stored processes are scripts saved on the SAS server you are connected to. You can run them from JMP and see the results of the script in JMP.

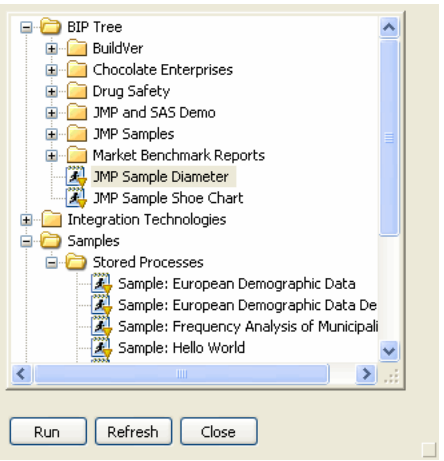
Note: Depending on the preferences you have set for SAS, error messages are sent either to the JMP log or to a separate SAS log window.

You must be connected to a metadata server to view and run stored processes. If you select **File > SAS > Browse SAS Folders** without such a connection, you are prompted to either make a connection or cancel your action.

To select and run a stored process

1 Select **File > SAS > Browse SAS Folders**.
The Browse SAS Folders window appears. See Figure 11.15.

Figure 11.15 Browse SAS Folders



2 Browse through the stored processes to find the one you want to run.
3 Select it.
4 Click **Run**.

On Windows, you can also right-click a stored process and select **Run**.

On Windows, you can right-click a stored process and select Copy Metadata Path, which copies the path to the clipboard. You can then paste it into a script window to include it as a parameter for the JSL operator `Meta Get Stored Process()`. For more information, see the *JMP Scripting Guide*.

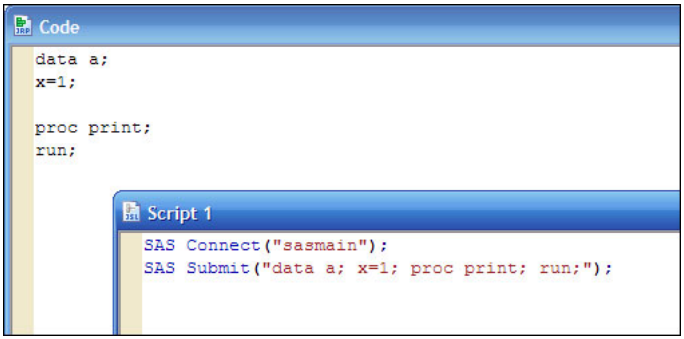
Note: Static graphs might not appear in the results returned from a SAS stored process when streaming output is selected. The "Sample:" programs shown in Figure 11.15 are provided for the SAS Information Delivery Portal, and produce streaming output by default. The graphs in these examples might not display correctly in JMP.

Stored processes send reports to HTML by default, but you can select RTF or PDF instead on the SAS Integration page of the Preferences window (**File > Preferences**).

Submitting SAS Code

You can submit SAS code directly from JMP to the currently active SAS server. If the submitted SAS code generates SAS Listing output, that output is automatically retrieved from the SAS server and displayed in JMP. Also, the generated SAS Log is retrieved, and, if there are any errors in the submitted code, the SAS Log is automatically displayed in the SAS Log window.

Figure 11.16 SAS Code Submission Example



To run SAS code directly from JMP

1 Either open an existing SAS program using **File > Open**, or create a new SAS program by selecting **File > SAS > New SAS Program** and typing in the SAS code.
2 From the **Edit** menu, select **Submit to SAS**.

   You can also right-click in the Program Editor window and select Submit to SAS from the context menu. The Submit to SAS item on the context menu includes the name of the active SAS server that the SAS code will be submitted to.

   You can also press the F8 key (⌘-shift-R on Macintosh).

To run SAS code using a JSL script

Write and run a JSL script that uses either the `SAS Submit` or `SAS Submit File` JSL functions. For more information about writing JSL scripts that submit SAS code, see the *JMP Scripting Guide*.

To view the SAS Listing Output

If the submitted SAS code generates SAS Listing (textual) output, that output is automatically be displayed in a SAS Output window when the job is completed. If you need to view the SAS Listing output again later in the JMP session, select **File > SAS > Open SAS Output Window**. The SAS Output Window retains the listing output from the previous 25 submits to the active SAS server.

To view the SAS Log

If the submitted SAS code contained errors, the SAS Log window for the active SAS server is automatically opened, displaying the SAS Log for the job. However, you can view the SAS Log for the most recent 25 submits to the active server at any time by selecting **File > SAS > Open SAS Log Window**.

If you prefer that SAS Log information is appended to the JMP log after a submit completes:

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Open the SAS Integration category.
3 In the Show SAS Log section, select **JMP Log** rather than **Separate Window**.

Also in the Show SAS Log section, you can set whether the SAS Log should be displayed **Always**, **Never**, or **On Error** (the default).

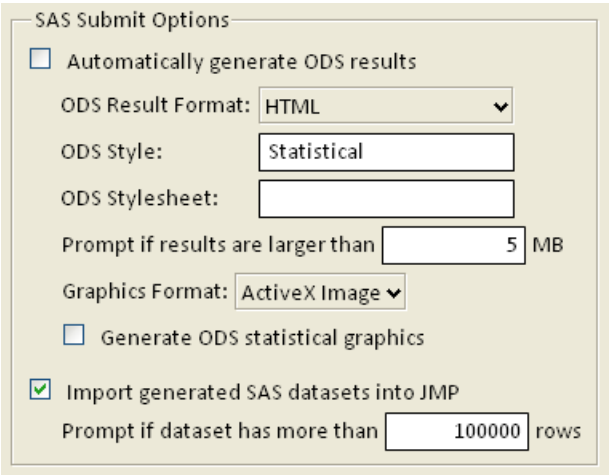
Generating ODS Results

The SAS Output Delivery System (ODS) is a powerful mechanism for generating reports in HTML, RTF, PDF and other formats. ODS output is generally much more attractive and customizable than plain-text SAS Listing output. In JMP 8, it is quite simple to request that your submitted SAS code generate ODS results rather than SAS Listing output.

To generate ODS results from your submitted SAS code

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Open the SAS Integration category and find the large SAS Submit Options group, as shown in Figure 11.17.

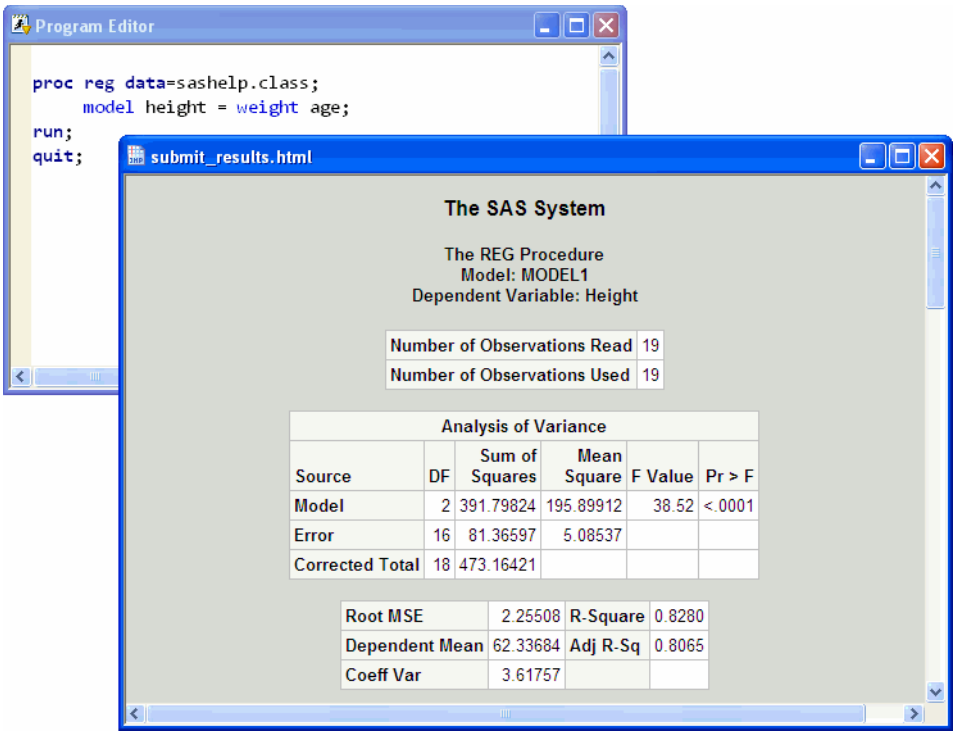
Figure 11.17 SAS Submit Options in Preferences


SAS Submit Options
Automatically generate ODS results
ODS Result Format: HTML
ODS Style: Statistical
ODS Stylesheet:
Prompt if results are larger than 5 MB
Graphics Format: ActiveX Image
Generate ODS statistical graphics
Import generated SAS datasets into JMP
Prompt if dataset has more than 100000 rows

3 Check the **Automatically generate ODS results** option.
4 From the **ODS Result Format** menu, select the format in which to generate the ODS results: HTML, PDF, or RTF.
5 If desired, you can use other options in that section to specify a style or style sheet to be used to format the results, or set the format for generated graphics. For more details, see "Specifying Settings for SAS Integration," p. 351 in the "Personalizing JMP" chapter.

Performing the previous steps causes JMP to generate additional SAS code, including an ODS statement, that is wrapped around the SAS code you submit. The SAS code that you submit then automatically generates ODS results in the specified format, and those results are downloaded to your computer and displayed either within JMP, when possible, or in an appropriate external application. Figure 11.18 shows SAS code that was submitted with preferences set to generate ODS results in HTML format.

Figure 11.18 Example of SAS ODS Results in JMP



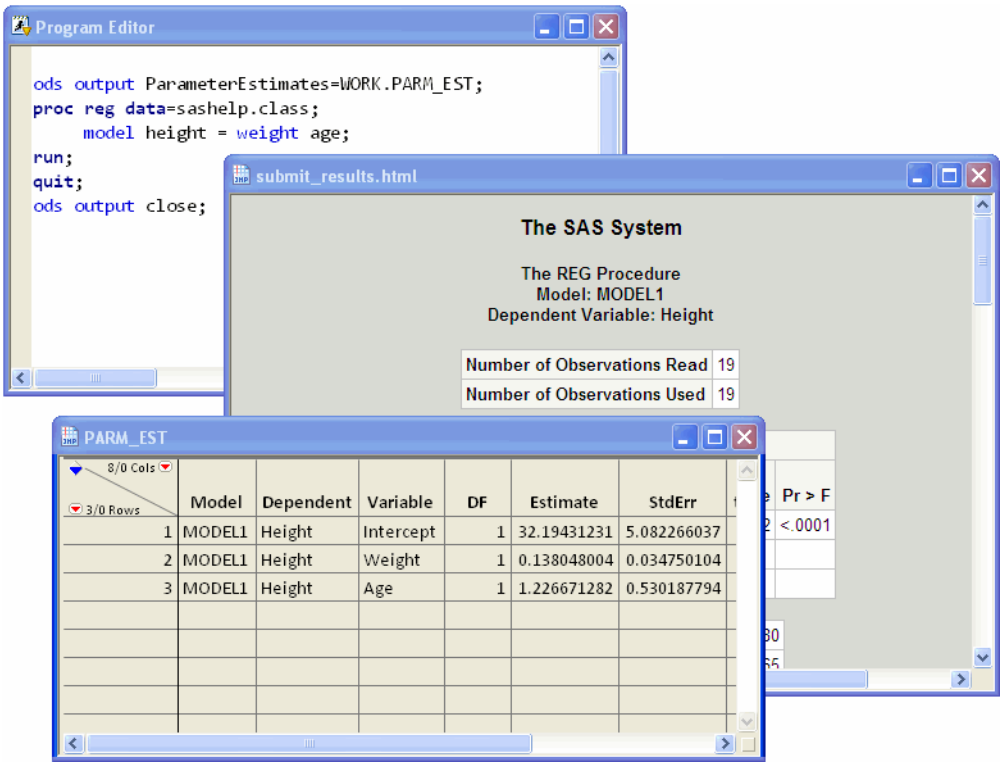
Retrieving Generated SAS Data Sets

SAS code that you submit might generate SAS data sets. You can have them automatically imported into JMP for further analysis.

1 Select **File > Preferences** (Windows/Linux) or **JMP > Preferences** (Macintosh).
2 Open the SAS Integration category.
3 Select the **Import generated SAS data sets into JMP** option.

Figure 11.19 shows some SAS code submitted with preferences set to generate ODS results and automatically import generated SAS data sets.

Figure 11.19 ODS Results and Generated SAS Results



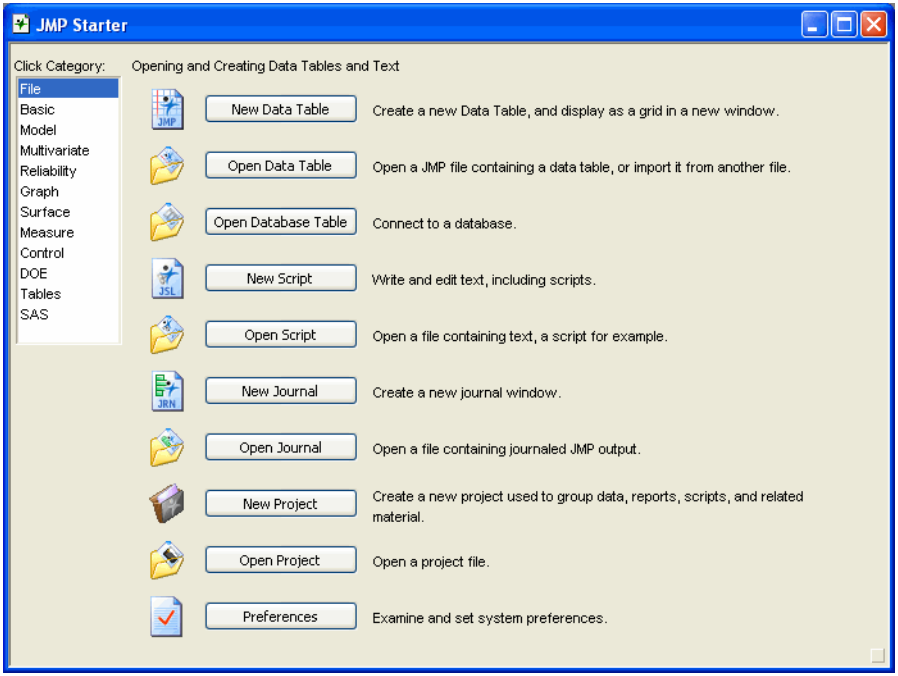
Appendix A

JMP Starter

A Review of Categories and Buttons

When the JMP application opens, you see the JMP Starter. The JMP Starter, as illustrated below, is a good way to get started if you haven't used JMP before. It gives alternative access to most commands found on the main menu or on toolbars.

This chapter gives an overview of the JMP Starter and briefly describes its tabbed pages and the items or commands on them.



Contents

Overview of the JMP Starter Window 399
The File Category 399
The Basic Category 401
The Model Category 402
The Multivariate Category 404
The Reliability Category 406
The Graph Category 407
The Surface Category 410
The Measure Category 411
The Control Category 412
The DOE Category 413
The Tables Category 415
The SAS Category 417

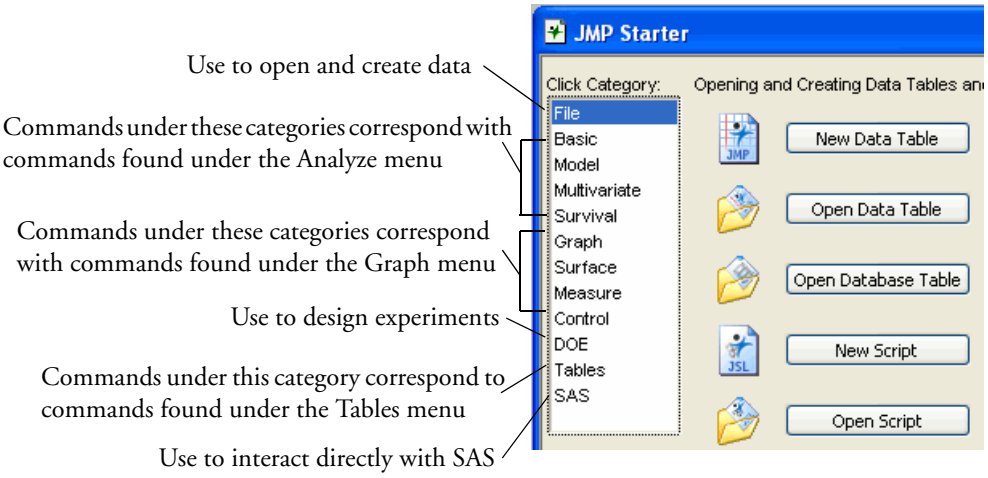
Overview of the JMP Starter Window

When JMP opens, the JMP Starter appears behind the Tip of the Day window. The JMP Starter gives alternative access to most commands found on the main menu or on toolbars. You can close the JMP Starter if you want; it is not required for running JMP.

To open and close the JMP Starter, select **View > JMP Starter** on Windows and Linux or **Window > JMP Starter** under Macintosh.

The JMP Starter categories are organized in a way similar to the main menu, as illustrated in Figure A.1. The four categories that follow the **File** category correspond with options available under the Analyze menu. They lead you step by step from your data to an appropriate analysis. The next four categories correspond with the Graph menu. The next two correspond with the DOE and Tables menu.

Figure A.1 JMP Starter Categories

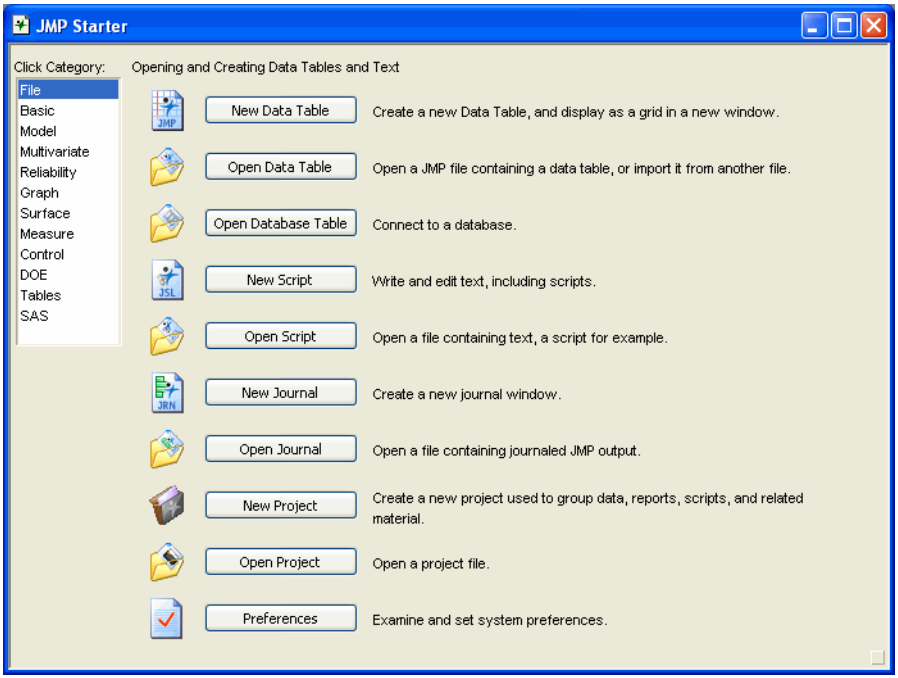


The File Category

The JMP Starter first appears with the **File** category showing, as in Figure A.2. Most commands in the **File** category correspond to **File** menu commands on the main menu bar.

The commands in the **File** category open JMP data tables or other types of JMP windows, which is often what you need to do first.

Figure A.2 JMP Starter File Page



New Data Table Opens an empty untitled data table. See "Creating New Data Tables," p. 10, for details.

Open Data Table Displays a window you use to locate the file you want to open. This window also lets you specify the file format of the incoming file. See "Opening Existing JMP Files," p. 11, for details.

Open Database Table Opens a connection to any database on your system that has an ODBC driver. See "Opening Data from a Database," p. 26, and "Saving Data Tables to a Database," p. 113, for details.

New Script Opens a new empty script window, which is an editable text window to enter and submit JMP Scripting Language (JSL) commands. See the *JMP Scripting Guide* for details about JSL.

Open Script Displays a specialized open file window to locate the script you want to open. See "Opening Existing JMP Files," p. 11, for details.

New Journal Opens an empty journal window. See "Saving Using the Journal Command," p. 116, for details.

Open Journal Displays a specialized open file window to locate the journal you want to open. See "Opening Existing JMP Files," p. 11, for details.

New Project Opens an empty project. See "Creating a JMP Project," p. 124, for details.

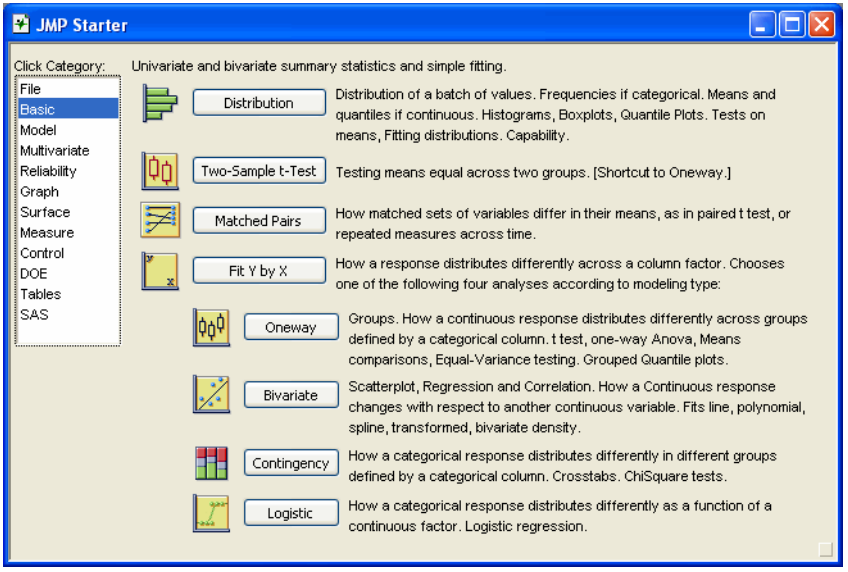
Open Project Displays a specialized open file window to locate the project you want to open. See "Opening Existing JMP Files," p. 11, for details.

Preferences Enables you to specify general and specific settings and save the settings so they are associated with your JMP session. See "To change preferences," p. 329, for details.

The Basic Category

The **Basic** category (Figure A.3) addresses univariate and bivariate analyses. You see how to examine variables one at a time by looking at distributions and comparing them to known distributions. When there are two variables, a single response (*y*) and a single factor (*x*), JMP performs the appropriate bivariate analysis according to whether the variables are continuous or categorical. These analyses can be run by clicking their buttons on the **Basic** category, as shown in Figure A.3.

Figure A.3 JMP Starter Basic Category


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Univariate and bivariate summary statistics and simple fitting.
Distribution
Distribution of a batch of values. Frequencies if categorical. Means and quantiles if continuous. Histograms, Boxplots, Quantile Plots. Tests on means, Fitting distributions. Capability.
Two-Sample t-Test
Testing means equal across two groups. [Shortcut to Oneway.]
Matched Pairs
How matched sets of variables differ in their means, as in paired t test, or repeated measures across time.
Fit Y by X
How a response distributes differently across a column factor. Chooses one of the following four analyses according to modeling type:
Oneway
Groups. How a continuous response distributes differently across groups defined by a categorical column. t test, one-way Anova, Means comparisons, Equal-Variance testing. Grouped Quantile plots.
Bivariate
Scatterplot, Regression and Correlation. How a Continuous response changes with respect to another continuous variable. Fits line, polynomial, spline, transformed, bivariate density.
Contingency
How a categorical response distributes differently in different groups defined by a categorical column. Crosstabs. ChiSquare tests.
Logistic
How a categorical response distributes differently as a function of a continuous factor. Logistic regression.

Distribution Clicking the **Distribution** button, or choosing **Analyze > Distribution,** launches the Distribution platform, which describes the distribution of values in a data table column using histograms and other graphical and text reports. See "Initial Text Reports" of *JMP Statistics and Graphics Guide*.

Two-Sample *t*-Test Clicking the **Two-Sample t-Test** button takes you directly to a window for setting up a one-way analysis. Use this button rather than clicking **Analyze > Fit Y by X**.

Matched Pairs Clicking the **Matched Pairs** button, or choosing **Analyze > Matched Pairs**, looks at the mean difference between two (or more) columns. It plots the points in a rotated scatterplot that presents them in terms of the differences and means of two variables.

The chapter "Paired Data" in the *JMP Statistics and Graphics Guide* discusses matched pairs and shows a unique graphical representation for that type of analysis.

Fit Y by X Clicking the **Fit Y by X** button, or choosing **Analyze > Fit Y by X**, launches a report platform for each pair of columns in the active data table that are assigned *x* and *y* roles for the analysis.

The four sub-buttons under **Fit Y by X** lead directly to one of the four models within the Fit Y by X platform:

Oneway If *x* has a nominal or ordinal analysis type and *y* is continuous, clicking the **Oneway** button and making your selections in the window plot the distribution of *y* values for each discrete value of *x* and computes a one-way analysis of variance table.

Bivariate If both *x* and *y* have continuous analysis types, clicking the **Bivariate** button and making your selections in the window displays a scatterplot.

Contingency If both *x* and *y* have a nominal or ordinal modeling type, clicking the **Contingency** button and making your selections in the window displays a contingency table and a mosaic bar chart.

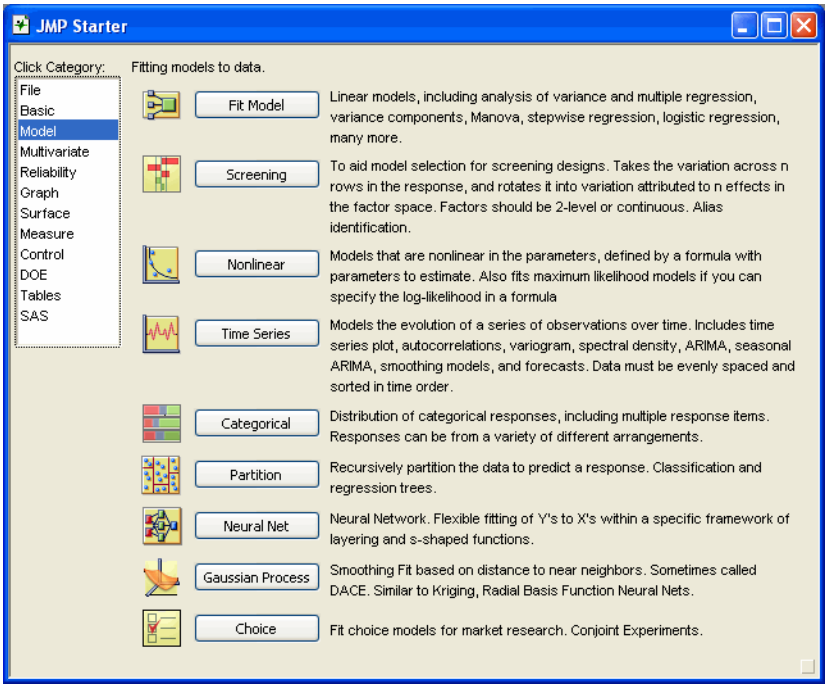
Logistic If *x* is continuous and *y* is nominal or ordinal, clicking the **Logistic** button and making your selections in the window performs a logistic regression and displays a family of logistic probability curves.

The chapters "Bivariate Scatterplot and Fitting," "One-Way ANOVA," "Contingency Tables Analysis," and "Simple Logistic Regression" of *JMP Statistics and Graphics Guide* cover these four cases.

The Model Category

The **Model** category (Figure A.4) gives choices for fitting all types of models—from simple regression and analysis of variance to complex nonlinear fits.

Figure A.4 JMP Starter Model Category


JMP Starter
Click Category:
Fitting models to data.
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Fit Model
Linear models, including analysis of variance and multiple regression, variance components, Manova, stepwise regression, logistic regression, many more.
Screening
To aid model selection for screening designs. Takes the variation across n rows in the response, and rotates it into variation attributed to n effects in the factor space. Factors should be 2-level or continuous. Alias identification.
Nonlinear
Models that are nonlinear in the parameters, defined by a formula with parameters to estimate. Also fits maximum likelihood models if you can specify the log-likelihood in a formula
Time Series
Models the evolution of a series of observations over time. Includes time series plot, autocorrelations, variogram, spectral density, ARIMA, seasonal ARIMA, smoothing models, and forecasts. Data must be evenly spaced and sorted in time order.
Categorical
Distribution of categorical responses, including multiple response items. Responses can be from a variety of different arrangements.
Partition
Recursively partition the data to predict a response. Classification and regression trees.
Neural Net
Neural Network. Flexible fitting of Y's to X's within a specific framework of layering and s-shaped functions.
Gaussian Process
Smoothing Fit based on distance to near neighbors. Sometimes called DACE. Similar to Kriging, Radial Basis Function Neural Nets.
Choice
Fit choice models for market research. Conjoint Experiments.

Fit Model Clicking the **Fit Model** button, or choosing **Analyze > Fit Model**, fits one or more *y* variables to a model of *x* variables.

See "Introduction to Model Fitting," "Standard Least Squares: Introduction," "Standard Least Squares: Perspectives on the Estimates," "Standard Least Squares: Exploring the Prediction Equation," and "Standard Least Squares: Random Effects," of *JMP Statistics and Graphics Guide* for a detailed discussion of the Fit Model window and Fit Model analyses.

Screening Clicking the **Screening** button, or choosing **Analyze > Modeling > Screening**, helps select a model to fit to a two-level screening design by showing which effects are large.

See the *JMP Statistics and Graphics Guide* for a detailed discussion of the Screening platform.

Nonlinear Clicking the **Nonlinear** button, or choosing **Analyze > Modeling > Nonlinear**, lets you specify nonlinear models, which are models that are nonlinear in their parameters. You orchestrate the fitting process as a coordination of three important parts of JMP: the data table, the formula editor, and the nonlinear fit platform.

Details about the JMP data table and formula editor are in the chapters "Entering, Editing, and Managing Data," p. 47, "Reshaping Data," p. 221, and "Formula Editor," p. 285 in this book.

See the chapter "Nonlinear Regression" of *JMP Statistics and Graphics Guide* for more about nonlinear fitting.

Time Series Clicking the **Time Series** button, or choosing **Analyze > Modeling > Time Series**, looks at the relationship between a value and its lagged values. The data must be sorted and have

equal intervals between time periods. **Time Series** plots the time series and autocorrelations, shows a variogram, and shows the spectral density.

"Time Series Analysis" of *JMP Statistics and Graphics Guide* discusses time series analysis and gives examples and statistical details

Categorical Clicking the **Categorical** button, choosing **Analyze > Modeling > Categorical**, does tabulation and summarization of categorical response data, including multiple response data, and calculates test statistics.

See the *JMP Statistics and Graphics Guide* for more details categorical response analysis.

Partition Clicking the **Partition** button, or choosing **Analyze > Modeling > Partition**, recursively partitions rows into groups according to *x*-values that associate with *y*-values. This partitioning creates a tree of partitions. The factor columns (*x*) can be either continuous or categorical (nominal or ordinal).

See the *JMP Statistics and Graphics Guide* for details about the Partition platform.

Neural Net Clicking the **Neural Net** button, or choosing **Analyze > Modeling > Neural Net**, fits a single layer neural network. The neural network is a set of nonlinear equations that predict output variables (*y*) from input variables (*x*) in a flexible way using layers of linear regressions and S-shaped functions. JMP fits the neural net using standard nonlinear least squares regression methods.

See the *JMP Statistics and Graphics Guide* for details about Neural Nets.

Gaussian Process Clicking the **Gaussian Process** button, or choosing **Analyze > Modeling > Gaussian Process**, models the relationship between a continuous response and one or more continuous predictors. The Gaussian Process platform fits a spatial correlation model to the data, where the correlation of the response between two observations decreases as the values of the independent variables become more distant.

See the *JMP Statistics and Graphics Guide* for details about Gaussian processes.

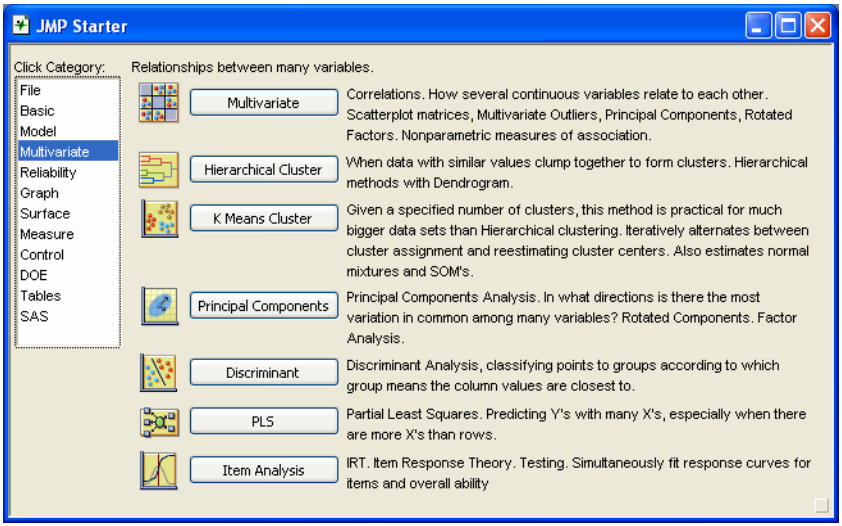
Choice Clicking the **Choice** button, or choosing **Analyze > Modeling > Choice**, makes probabilistic predictions regarding human choice. It is particularly valuable in marketing research and product design. The Choice platform is designed for use in market research experiments.

See the *JMP Statistics and Graphics Guide* for details about Choice models.

The Multivariate Category

The **Multivariate** category introduces ways to look at continuous variables when they are considered as responses only; there are no factor or independent variables. Multivariate exploration with correlations and cluster analysis lets you look at many variables at the same time.

Figure A.5 JMP Starter Multivariate Category


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Relationships between many variables.
Multivariate
Correlations. How several continuous variables relate to each other. Scatterplot matrices, Multivariate Outliers, Principal Components, Rotated Factors. Nonparametric measures of association.
Hierarchical Cluster
When data with similar values clump together to form clusters. Hierarchical methods with Dendrogram.
K Means Cluster
Given a specified number of clusters, this method is practical for much bigger data sets than Hierarchical clustering. Iteratively alternates between cluster assignment and reestimating cluster centers. Also estimates normal mixtures and SOM's.
Principal Components
Principal Components Analysis. In what directions is there the most variation in common among many variables? Rotated Components. Factor Analysis.
Discriminant
Discriminant Analysis, classifying points to groups according to which group means the column values are closest to.
PLS
Partial Least Squares. Predicting Y's with many X's, especially when there are more X's than rows.
Item Analysis
IRT. Item Response Theory. Testing. Simultaneously fit response curves for items and overall ability

Multivariate Clicking the **Multivariate** button, or choosing **Analyze > Multivariate Methods > Multivariate**, gives you ways to explore how several variables relate to each other. The platform begins with a standard correlation matrix and gives additional options for correlations and other techniques for looking at several variables.

Hierarchical Cluster and K-Means Cluster Clustering is a technique of grouping rows together that share similar values across a number of variables. It is an exploratory technique to help you understand the clumping structure of your data. Clicking the **Hierarchical Cluster** or **K-Means Cluster** buttons, or choosing **Analyze > Multivariate Methods > Cluster** produces a window that lets you select whether to run a K-means cluster or a hierarchical cluster.

- Hierarchical clustering is appropriate for small tables, up to several hundred rows. It combines rows in a hierarchical sequence portrayed as a tree. In JMP, the tree, also called a *dendrogram*, is a dynamically responding graph. You can specify the number of clusters after the tree is built.
- K-means clustering is suitable for larger tables, up to hundreds of thousands of rows. It begins with a cluster seed point. Then the clustering process iterates between assigning points to the number of clusters you specify and recalculating cluster centers.
  After the clustering process is complete, you can save the cluster assignments to the data table or use them to set colors and markers for the data table rows.

See the chapters "Correlations and Multivariate Techniques," and "Clustering" of *JMP Statistics and Graphics Guide* for a detailed discussion of multivariate relationships and clustering.

Principal Components Clicking the **Principal Components** button, or choosing **Analyze > Multivariate Methods > Principal Components**, helps derive a small number of independent linear combinations (principal components) of a set of variables that capture as much of the variability in the original variables as possible.

See the *JMP Statistics and Graphics Guide* for details about principal components.

Discriminant Clicking the **Discriminant** button, or choosing **Analyze > Multivariate Methods > Discriminant**, starts a discriminant analysis. The technique is based on how close a set of measurement variables are to the multivariate means of the levels being predicted. Also, you could do a stepwise discriminant analysis.

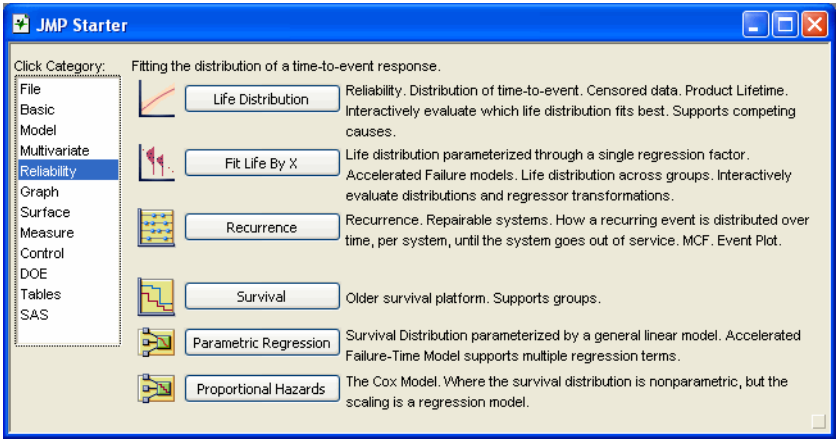
PLS Clicking the **PLS** button, or choosing **Analyze > Multivariate Methods > PLS**, fits models using the partial least squares (PLS) method that balances the two objectives of explaining response variation and explaining predictor variation. The PLS techniques work by extracting successive linear combinations of the predictors, called *factors* (also called *components* or *latent vectors*) that address one or both of these two goals. The PLS platform in JMP also enables you to select the number of extracted factors by cross validation, which involves fitting the model to part of the data and minimizing the prediction error for the unfitted part.

Item Analysis Clicking the **Item Analysis** button, or choosing **Analyze > Multivariate Methods > Item Analysis**, provides analysis of test items using the Item Response Theory.

The Reliability Category

Reliability data contain duration times until the occurrence of a specific event and are sometimes referred to as event-time or survival data. In survival data, the event can be failure, such as the failure of an engine or death of a patient.

Figure A.6 JMP Starter Reliability


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Fitting the distribution of a time-to-event response.
Life Distribution
Reliability. Distribution of time-to-event. Censored data. Product Lifetime. Interactively evaluate which life distribution fits best. Supports competing causes.
Fit Life By X
Life distribution parameterized through a single regression factor. Accelerated Failure models. Life distribution across groups. Interactively evaluate distributions and regressor transformations.
Recurrence
Recurrence. Repairable systems. How a recurring event is distributed over time, per system, until the system goes out of service. MCF. Event Plot.
Survival
Older survival platform. Supports groups.
Parametric Regression
Survival Distribution parameterized by a general linear model. Accelerated Failure-Time Model supports multiple regression terms.
Proportional Hazards
The Cox Model. Where the survival distribution is nonparametric, but the scaling is a regression model.

The buttons on the **Reliability** category, also found under **Analyze > Reliability and Survival**, can help you analyze survival data several ways:

Life Distribution Is used to find the most suited distributional fir for your data, and to make predictions. Weibull, Lognormal, Frechet, Extreme Value, and other common distributions are included.

Fit Life By X Is used to analyze lifetime events when only one factor is present. Transformations include Arrhenius, Erying, voltage, and linear. This platform also enables you to create a custom transformation of your data. You can also compare different distributions at the same factor level

or the same distribution across different factor levels. You can also launch this platform by using **Analyze > Reliability and Survival > Fit Life By X**.

Recurrence Starts an analysis that looks at the age of a system when it requires a repair. A system can have multiple repairs, each with its associated age, and is followed until it is no longer in service. A typical system might be some component of an engine or appliance.

Survival (Univariate survival analysis) is an older survival platform for a univariate survival analysis using product-limit (Kaplan-Meier) life table survival computations with estimation of Weibull, lognormal, and exponential parameters.

Parametric Regression Is used for an analysis that tests the fit of an exponential, Weibull, or lognormal distribution. The accelerated failure-time model supports multiple regression terms.

Proportional Hazards Is used for a survival analysis that fits a Cox model.

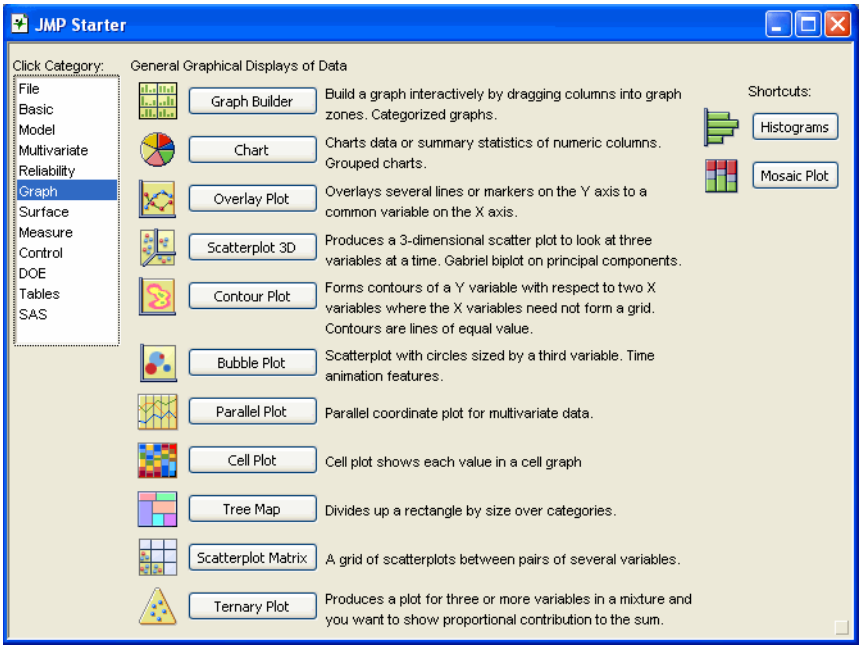
Note: You can also use the nonlinear platform to handle nonlinear models with loss functions for other parametric survival modeling.

See the *JMP Statistics and Graphics Guide* for more about the survival platform.

The Graph Category

The **Graph** category, shown in Figure A.7, corresponds with commands in the main menu that produce plots and charts of summarized data, a three-dimensional spinning plot, contour, and ternary plots.

Figure A.7 JMP Starter Graph Page


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
General Graphical Displays of Data
Graph Builder
Build a graph interactively by dragging columns into graph zones. Categorized graphs.
Chart
Charts data or summary statistics of numeric columns. Grouped charts.
Overlay Plot
Overlays several lines or markers on the Y axis to a common variable on the X axis.
Scatterplot 3D
Produces a 3-dimensional scatter plot to look at three variables at a time. Gabriel biplot on principal components.
Contour Plot
Forms contours of a Y variable with respect to two X variables where the X variables need not form a grid. Contours are lines of equal value.
Bubble Plot
Scatterplot with circles sized by a third variable. Time animation features.
Parallel Plot
Parallel coordinate plot for multivariate data.
Cell Plot
Cell plot shows each value in a cell graph
Tree Map
Divides up a rectangle by size over categories.
Scatterplot Matrix
A grid of scatterplots between pairs of several variables.
Ternary Plot
Produces a plot for three or more variables in a mixture and you want to show proportional contribution to the sum.
Shortcuts:
Histograms
Mosaic Plot

Graph Builder Clicking the **Chart** button, or choosing **Graph > Graph Builder**, enables the interactive display of both continuous and categorical data. Its graphs are built through drag and drop. Each drag shows a preview of the resulting report, enabling quick visualization of many chart types. A variety of graph elements are available (scatterplots, box plots, histograms, trend lines, bar charts, smoothers for studying univariate and multivariate relationships). Data can be partitioned by both continuous and categorical variables to easily see interactions.

Chart Clicking the **Chart** button, or choosing **Graph > Chart**, and completing the window gives a chart for every numeric *y* specified where the *y*'s are statistics to chart. The *x*-values are always treated as discrete values. **Chart** automatically updates when values change in the current data table and you then activate the chart window.

Overlay Plot Clicking the **Overlay Plot** button, or choosing **Graph > Overlay Plot**, and making your selections in the window gives an overlaid plot of a single numeric or categorical *x* column and all numeric *y* variables. The plots for each *y* can be shown separately, with or without a common *x*-axis. Plots can be modified with range and needle options, color, log axes, and grid lines. Overlay plots automatically update when you change values in the current data table and then activate the overlay plot report window.

Scatterplot 3D Clicking the **Scatterplot 3D** button, or choosing **Graph > Scatterplot 3D**, displays a three-dimensional view of data and an approximation of higher dimensions through principal components. The plot is a rotatable display of the values of numeric columns in the

current data table. The Scatterplot 3D platform displays three variables at a time from the columns you select.

To help capture and visualize variation in higher dimensions, the Scatterplot 3D platform displays a biplot representation of the points and variables when you request principal components.

See the *JMP Statistics and Graphics Guide* for details about three-dimensional scatterplots.

Contour Plot Clicking the **Contour Plot** button, or choosing **Graph > Contour Plot**, and making your selections in the window constructs a contour plot for a response variable, *y*, for the values of two *x* variables. A contour plot requires two variables for the *x*- and *y*-axes and a third variable (denoted *y* in the Contour Plot window) for contours.

Parallel Plot Clicking the **Parallel Plot** button, or choosing **Graph > Parallel Plot**, draws a parallel coordinate plot, which shows connected line segments representing each row of a data table.

Cell Plot Clicking the **Cell Plot** button, or choosing **Graph > Cell Plot**, produces a rectangular array of cells drawn with a one-to-one correspondence to data table values.

Tree Map Clicking the **Tree Map** button, or choosing **Graph > Tree Map**, displays tree maps, which can be thought of as bar charts that have been folded over in two dimensions, leaving no unused space. It is useful when there are a lot of categories. Tree maps are a graphical technique of observing patterns among groups that have many levels. They are especially useful in cases where histograms are ineffective.

Bubble Plot Clicking the **Bubble Plot** button, or choosing **Graph > Bubble Plot**, displays a scatter plot which represents its points as circles (bubbles). The bubbles can be sized according to a another column, colored by another column, aggregated across groups defined by one or more other columns, and dynamically indexed by a time column. With the opportunity to see up to five dimensions at once (*x* position, *y* position, size, color, and time), bubble plots can produce dramatic visualizations and make interesting discoveries easy. You can also create a Flash (.swf) version of the Bubble Plot.

See the *JMP Statistics and Graphics Guide* for details about bubble plots.

Scatterplot Matrix Clicking the **Scatterplot Matrix** button, or choosing **Analyze > Multivariate Methods > Multivariate**, explores how multiple variables relate to each other and how points fit that relationship. This platform helps you see correlations between two or more response (*y*) variables, look for points that are outliers, and examine principal components to look for factors.

Ternary Plot Clicking the **Ternary Plot** button, or choosing **Graph > Ternary Plot**, creates ternary plots, which display the distribution and variability of three-part compositional data. Examples of compositional data are the proportion of sand, silt, and clay in soil, or the proportion of three chemical agents in a trial drug. You can use data expressed in proportions, or in absolute measures. The ternary plot platform converts absolute values to proportions.

The ternary plot in JMP also has a contour feature, which means you can use a response measure at each point to form a contour plot within the ternary structure.

See the *JMP Statistics and Graphics Guide* for details and examples of ternary plots.

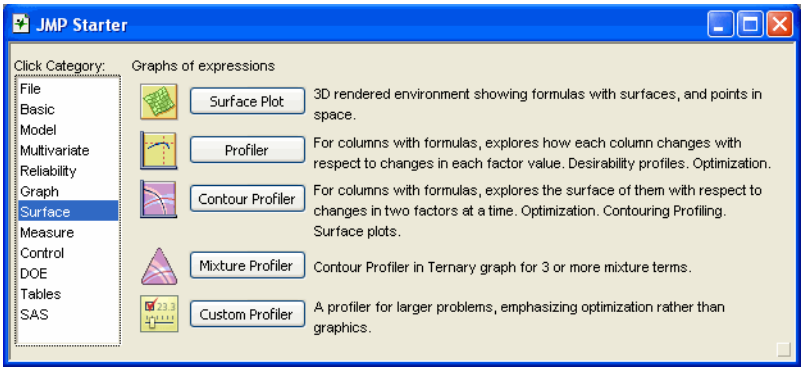
Histograms Clicking the Histograms button, or choosing Analyze > Distribution, lets you construct an analysis that shows a distribution of values with histograms and other graphical and textual reports.

Mosaic Plot Clicking the **Mosaic Plot** button when you have nominal or ordinal *x* and *y* values produces a contingency table and a mosaic bar chart.

The Surface Category

The **Surface** category, shown in Figure A.8, corresponds with commands in the main menu that produce multi-dimensional graphs, such as profilers and surface plots.

Figure A.8 JMP Starter Surface Page


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Graphs of expressions
Surface Plot
3D rendered environment showing formulas with surfaces, and points in space.
Profiler
For columns with formulas, explores how each column changes with respect to changes in each factor value. Desirability profiles. Optimization.
Contour Profiler
For columns with formulas, explores the surface of them with respect to changes in two factors at a time. Optimization. Contouring Profiling. Surface plots.
Mixture Profiler
Contour Profiler in Ternary graph for 3 or more mixture terms.
Custom Profiler
A profiler for larger problems, emphasizing optimization rather than graphics.

Surface Plot Clicking the **Surface Plot** button, or choosing **Graph > Surface Plot**, produces plots with smooth, three-dimensional surfaces.

Profiler The report that results from clicking the **Profiler** button, or choosing **Graph > Profiler**, produces a *prediction profiler* for the effect variables in a model, with one or more *y* variables. The prediction profiler displays *prediction traces* for each *x* variable. A prediction trace is the predicted response as one variable is changed while the others are held constant at the current values. If you save the prediction equations for a model, you can access the prediction profiler for that data table directly with **Graph > Profiler** without rerunning the model. You can also use this command to create a Flash (.swf) version of the Profiler.

Contour Profiler The report that results from clicking the **Contour Profiler** button, or choosing **Graph > Contour Profiler**, does interactive contour profiling. This is useful for optimizing response surfaces graphically. This interactive plot lets you adjust both multiple responses and multiple factors simultaneously and shows acceptable factor setting regions for response values you specify. If you save the prediction equations for a model, **Graph > Contour Profiler** accesses the contour profiler for that data table directly without rerunning the model.

The chapter "Standard Least Squares: Exploring the Prediction Equation" of *JMP Statistics and Graphics Guide* covers the profiler and the contour profiler.

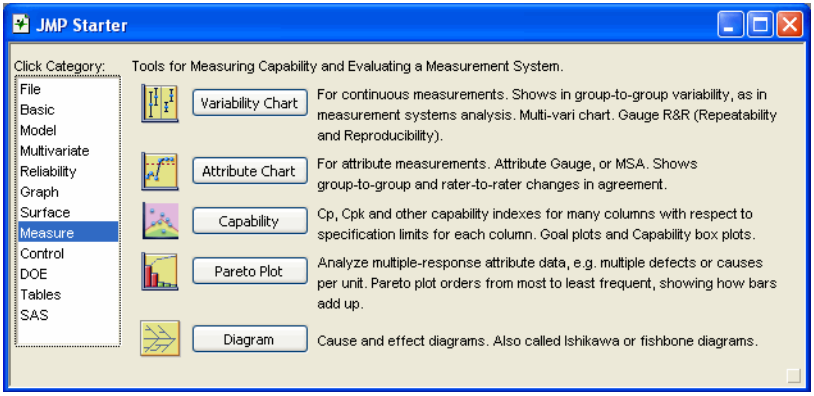
Mixture Profiler lets you profile models involving mixture experiments. It respects constrained models and enables you to explore alternatives inside feasible design regions.

Custom Profiler Clicking the **Custom Profiler** button, or choosing **Graph > Custom Profiler**, displays an interface for interacting with and optimizing a prediction formula.

The Measure Category

The **Measure** category, shown in Figure A.9, accesses the commands on the **Graph** menu that are used in statistical quality control.

Figure A.9 The JMP Starter Measure Category


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Tools for Measuring Capability and Evaluating a Measurement System.
Variability Chart
For continuous measurements. Shows in group-to-group variability, as in measurement systems analysis. Multi-vari chart. Gauge R&R (Repeatability and Reproducibility).
Attribute Chart
For attribute measurements. Attribute Gauge, or MSA. Shows group-to-group and rater-to-rater changes in agreement.
Capability
Cp, Cpk and other capability indexes for many columns with respect to specification limits for each column. Goal plots and Capability box plots.
Pareto Plot
Analyze multiple-response attribute data, e.g. multiple defects or causes per unit. Pareto plot orders from most to least frequent, showing how bars add up.
Diagram
Cause and effect diagrams. Also called Ishikawa or fishbone diagrams.

Variability Chart Clicking the **Variability Chart** button on the **Measure** page, or choosing **Graph > Variability/Gauge Chart**, performs a variability analysis, also called a *Gauge R&R analysis*. In a variability analysis, a number of parts assumed to be identical are taken from a production line. Each one is measured several times by a number of operators using different measuring instruments. You want to know the magnitudes of the variation due to operators, parts, and instruments.

The chapter "Variability Charts" of *JMP Statistics and Graphics Guide* documents the plots and reports produced by the variability platform.

Attribute Chart Click the **Attribute Chart Button**, or select **Graph > Variability/Gauge Chart** and choose **Attribute** from the drop-down menu, when your response values are binary or categorical. For example, a circuit might be measured as pass/fail. Because different reports are generated on the raters, raters each need to be in different columns. The chapter "Variability Charts" of *JMP Statistics and Graphics Guide* documents the plots and reports produced by the variability platform.

Capability Clicking the **Capability** button on the **Measure** page, or choosing **Graph > Capability**, gives a platform option for capability analysis for quality control applications. A capability study measures the deviation of a process from given specification limits. A window prompts you for the lower spec limit, upper spec limit, and target. You can also enter a known value for sigma, the process standard deviation.

See the chapter "Univariate Analysis" of *JMP Statistics and Graphics Guide* for examples of capability analysis.

Pareto Plot Clicking the **Pareto Plot** button on the **Measure** page, or choosing **Graph > Pareto Plot**, creates a bar chart (Pareto chart) that displays the severity (frequency) of problems in a quality-related process or operation. A Pareto chart is a statistical quality improvement tool that shows frequency, relative frequency, and cumulative frequency of problems. The defining

characteristic of Pareto plots is that the bars are in descending order of values, which visually emphasizes the most important measures or frequencies.

The chapter "Pareto Plots" of *JMP Statistics and Graphics Guide* discusses simple before-and-after Pareto charts and two-way comparative Pareto charts.

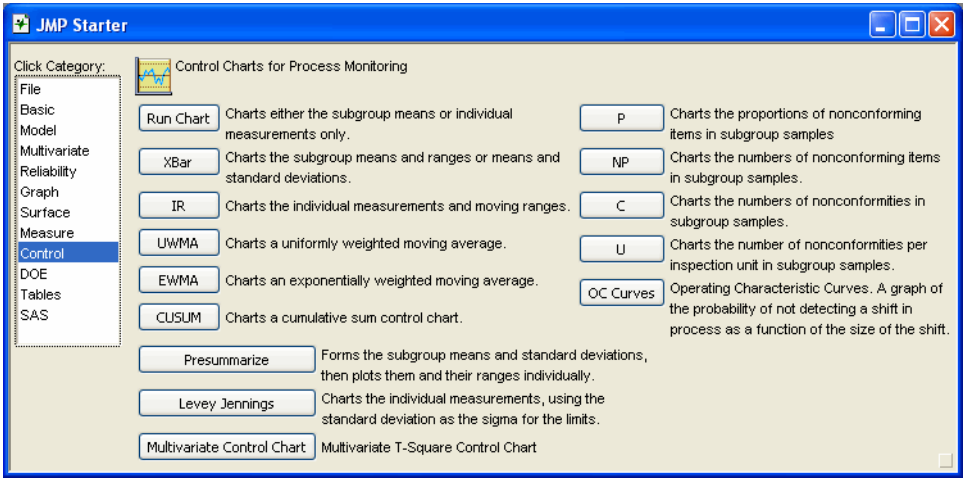
Diagram Clicking the **Diagram** button on the **Measure** page, or choosing **Graph > Diagram**, constructs *Ishikawa* charts, also called *fishbone* charts, or *cause-and-effect diagrams*. These charts are useful to organize the sources (causes) of a problem (effect), perhaps for brainstorming, or as a preliminary analysis to identify variables in preparation for further experimentation.

The chapter "Ishikawa Diagrams" of *JMP Statistics and Graphics Guide* describes creating these diagrams.

The Control Category

The **Control** category, shown in Figure A.10, accesses the commands that are used in statistical quality control.

Figure A.10 The JMP Starter Control Category


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Control Charts for Process Monitoring
Run Chart
Charts either the subgroup means or individual measurements only.
XBar
Charts the subgroup means and ranges or means and standard deviations.
IR
Charts the individual measurements and moving ranges.
UWMA
Charts a uniformly weighted moving average.
EWMA
Charts an exponentially weighted moving average.
CUSUM
Charts a cumulative sum control chart.
P
Charts the proportions of nonconforming items in subgroup samples
NP
Charts the numbers of nonconforming items in subgroup samples.
C
Charts the numbers of nonconformities in subgroup samples.
U
Charts the number of nonconformities per inspection unit in subgroup samples.
OC Curves
Operating Characteristic Curves. A graph of the probability of not detecting a shift in process as a function of the size of the shift.
Presummarize
Forms the subgroup means and standard deviations, then plots them and their ranges individually.
Levey Jennings
Charts the individual measurements, using the standard deviation as the sigma for the limits.
Multivariate Control Chart
Multivariate T-Square Control Chart

Run Chart Clicking the **Run Chart** button, or clicking **Graph > Control Chart > Run Chart**, gives an overlay of a single numeric or categorical *x* column and all specified numeric *y* variables.

XBar Clicking the **XBar** button offers a combination of $\bar{X}$-, R-, and S-charts. The $\bar{X}$-chart plots subgroup means (averages), the R-chart plots subgroup ranges, and the S-chart plots subgroup standard deviations.

IR Clicking the **IR** button gives either an individual measurement chart, which displays individual measurements, or a moving range chart, which displays moving ranges of two or more successive measurements.

UWMA Clicking the **UWMA** button gives a Uniformly Weighted Moving Average (UWMA) chart, also called a Moving Average chart. Each point on a UWMA chart is the average of the w most recent subgroup means, including the present subgroup mean.

EWMA Clicking the **EWMA** button gives an Exponentially Weighted Moving Average (EWMA) chart, also referred to as a Geometric Moving Average (GMA) chart. Each point on an EWMA chart is the weighted average of all the previous subgroup means, including the mean of the present subgroup sample. The weights decrease exponentially going backward in time.

CUSUM Clicking the **CUSUM** button gives a Cumulative Sum control chart, which displays cumulative sums of the deviations of measurements or subgroup means from a target value.

Presummarize Clicking the **Presummarize** button summarizes the process column into sample means and/or standard deviations, based either on the sample size or sample label chosen. Then it charts the summarized data in individuals and/or moving range charts.

Levey Jennings Clicking the **Levey Jennings** button gives a plot that shows a process mean with control limits based on a long-term sigma. The control limits are placed at 3s distance from the center line.

Multivariate Control Chart Clicking the **Multivariate Control Chart** button gives a t-squared control chart, which measures how far a multivariate point is from the target with respect to the covariance structure.

P Clicking the **P** button gives *P*-charts, which display the proportion of nonconforming (defective) items in subgroup samples which can vary in size. Since each subgroup for a *P*-chart consists of N items, and an item is judged as either conforming or nonconforming, the maximum number of nonconforming items in a subgroup is N.

NP Clicking the **NP** button gives *NP*-charts, which display the number of nonconforming (defective) items in constant sized subgroup samples. Since each subgroup for a *NP*-chart consists of N_i items, and an item is judged as either conforming or nonconforming, the maximum number of nonconforming items in subgroup i is N_i.

C Clicking the **C** button gives *C*-charts, which display the number of nonconformities (defects) in a subgroup sample that usually consists of one *inspection* unit. The maximum number of defects is unlimited.

U Clicking the **U** button gives *U*-charts, which display the number of nonconformities (defects) per unit in subgroup samples that can have a varying number of inspection units. The maximum number of defects is unlimited.

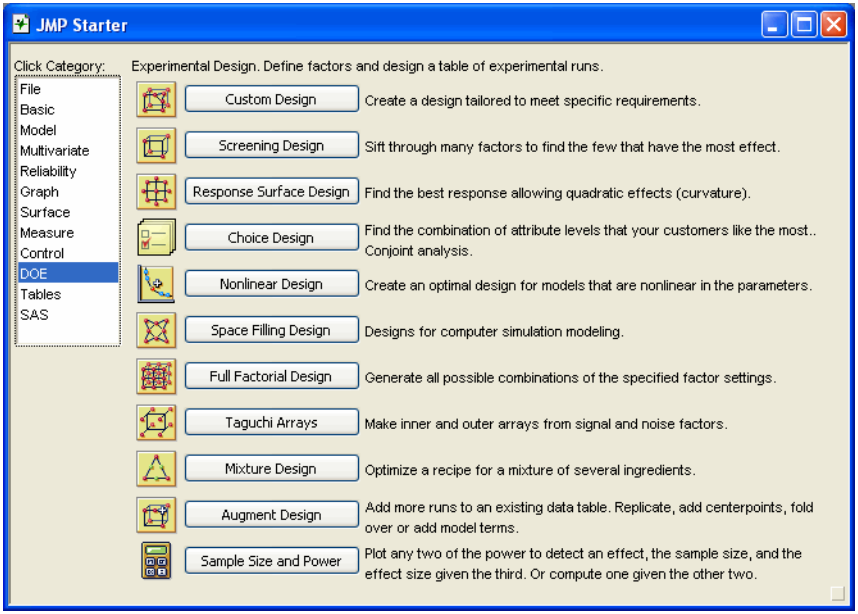
OC Curves Clicking the **OC Curves** button accesses a set of JSL scripts that compute and plot operating characteristic curves. The chapter "Statistical Control Charts" of *JMP Statistics and Graphics Guide* gives details about how to run the OC curves scripts.

The DOE Category

The **DOE** category, shown in Figure A.11, corresponds to the commands in the **DOE** main menu. These commands construct classical and custom experimental designs and save them in a JMP table. Selecting a design type presents an environment for describing the factors, responses and other specifications needed to make a design of that type.

See *JMP Design of Experiments* for complete documentation of DOE in JMP.

Figure A.11 JMP Starter DOE Category


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Experimental Design. Define factors and design a table of experimental runs.
Custom Design
Create a design tailored to meet specific requirements.
Screening Design
Sift through many factors to find the few that have the most effect.
Response Surface Design
Find the best response allowing quadratic effects (curvature).
Choice Design
Find the combination of attribute levels that your customers like the most.. Conjoint analysis.
Nonlinear Design
Create an optimal design for models that are nonlinear in the parameters.
Space Filling Design
Designs for computer simulation modeling.
Full Factorial Design
Generate all possible combinations of the specified factor settings.
Taguchi Arrays
Make inner and outer arrays from signal and noise factors.
Mixture Design
Optimize a recipe for a mixture of several ingredients.
Augment Design
Add more runs to an existing data table. Replicate, add centerpoints, fold over or add model terms.
Sample Size and Power
Plot any two of the power to detect an effect, the sample size, and the effect size given the third. Or compute one given the other two.

Custom Design Clicking the **Custom Design** button, or choosing **DOE > Custom Design**, generates a *D*-optimal design for the design you specify, and an optional *I*-optimal design for response surface designs. Custom designs can have continuous factors and categorical factors with arbitrary numbers of level, interactions, and mixture ingredients. A design can also have covariates, which are factors that already have unchangeable values; a design is built around the covariate. You can construct custom design models, including interaction terms and polynomial terms for continuous factors. Factors can have inequality constraints. You can also specify the number of experimental runs, which can be any number greater than or equal to the number of terms in the model.

Screening Design Clicking the **Screening Design** button, or choosing **DOE > Screening Design**, enables you to specify continuous factors, two- and three-level factors, and categorical factors. It creates a table of classical screening designs from which you can pick.

Response Surface Design Clicking the **Response Surface Design** button, or choosing **DOE > Response Surface Design**, lets you define a number of continuous factors. This environment then offers a table of classical response surface designs from which to select.

Choice Design Clicking on the Choice Design button, or choosing **DOE > Choice Design**, lets you design Choice experiments. See *Choice* above for details about Choice models.

Nonlinear Design Clicking the **Nonlinear Design** button, or choosing **DOE > Nonlinear Design**, lets you create an optimal design for models that are nonlinear in the parameters.

Space Filling Design Clicking the **Space Design Filling** button, or choosing **DOE > Space Filling Design**, lets you run experiments for modeling systems that are deterministic or near deterministic. You can choose to emphasize spreading points apart, mimic the uniform distribution, or choose a compromise between the two.

Full Factorial Design Clicking the **Full Factorial Design** button, or choosing **DOE > Full Factorial Design**, lets you specify a set of continuous and categorical factors with arbitrary numbers of levels. JMP creates the design containing all possible combinations of those factors.

Taguchi Arrays Clicking the **Taguchi Arrays** button, or choosing **DOE > Taguchi Arrays**, guides you through the definition of signal and noise factors. The signal factors form the inner array and the noise factors form the outer array. The inner and outer array designs are the traditional Taguchi orthogonal arrays such as L4, L8, L16, and so on.

Mixture Design Clicking the **Mixture Design** button, or choosing **DOE > Mixture Design**, lets you define a set of factors that are ingredients in a mixture. JMP creates a new window for choosing among several classical mixture design approaches such as simplex, extreme vertices, and lattice. For the extreme vertices approach, you can supply a set of linear inequality constraints limiting the geometry of the mixture factor space.

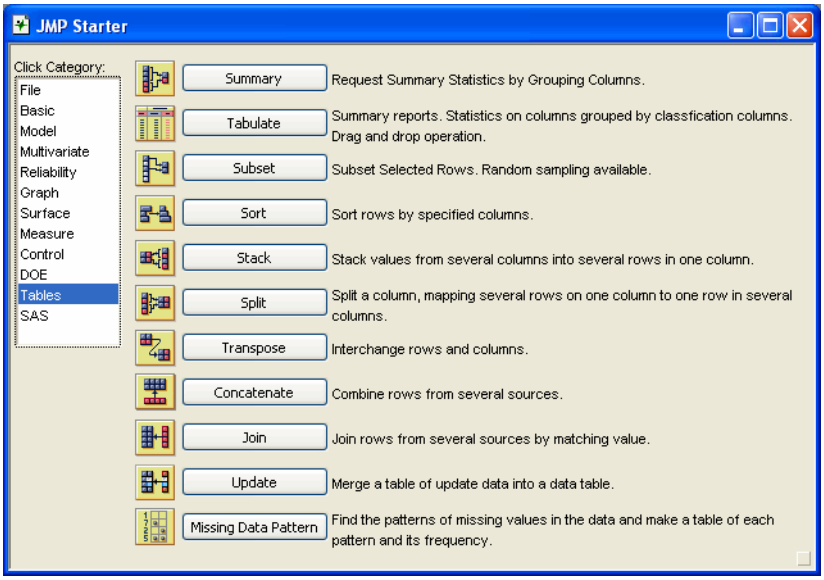
Augment Design Clicking the **Augment Design** button, or choosing **DOE > Augment Design**, lets you modify existing designs. You can add center points, replicate the design, create a foldover design, and add runs to the design using a model with more terms than the original design.

Sample Size and Power Clicking the **Sample Size and Power** button, or choosing **DOE > Sample Size and Power**, computes power, sample size, or the effect size you want to detect for a given alpha and error standard deviation. You supply two of these values and the sample size and power feature computes the third. If you supply only one of these values, the result is a plot of the other two. This feature is available for the single sample, two sample, and *k* sample situations.

The Tables Category

The **Tables** category (Figure A.12) corresponds to the commands in the **Tables** main menu. See the chapter "Reshaping Data," p. 221, for detailed descriptions and examples for each **Tables** menu command.

Figure A.12 JMP Starter Tables Category



The buttons on the **Tables** page can help you analyze data in several ways:

Summary Creates a *summary table*, which summarizes columns from the active data table, called its *source table*. The summary table has a single row for each level of a grouping variable you specify. Also, you can add columns of summary statistics to this table and request summary statistics.

Tabulate Creates a tabulated table from the active data table. It calculates, sorts, and displays totals and subtotals for you in a report format, rather than in a data table.

Subset Creates a new data table formed by the selected rows and columns or by a random sample in the active data table.

Sort Sorts a data table by one or more columns.

Stack Creates a new data table from the active table by stacking specified columns into a single column.

Split Creates a new data table from the active table by dividing one or more columns to form multiple columns.

Transpose Creates a new data table that has the columns of the active table as its rows and the rows of the active table as its columns.

Concatenate Creates a new data table from two or more open data tables by combining them end to end.

Join Creates a new data table by merging (joining) two tables side by side.

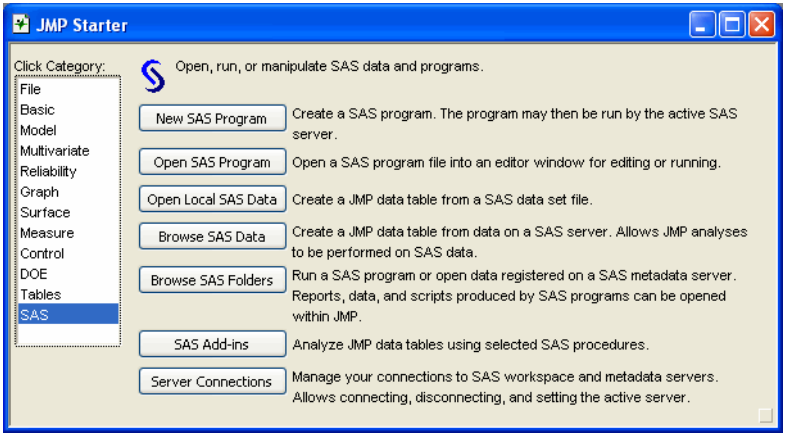
Update Updates one table with data from a second table without producing a new data table.

Missing Data Pattern Shows a pattern that your missing data creates. The pattern might help you make discoveries about your data.

The SAS Category

The **SAS** category (Figure A.13) corresponds to the commands in the **File > SAS** menu. See the chapter "SAS Integration," p. 377, for detailed descriptions and examples for each **File > SAS** menu command

Figure A.13 JMP Starter SAS Category


JMP Starter
Click Category:
File
Basic
Model
Multivariate
Reliability
Graph
Surface
Measure
Control
DOE
Tables
SAS
Open, run, or manipulate SAS data and programs.
New SAS Program
Create a SAS program. The program may then be run by the active SAS server.
Open SAS Program
Open a SAS program file into an editor window for editing or running.
Open Local SAS Data
Create a JMP data table from a SAS data set file.
Browse SAS Data
Create a JMP data table from data on a SAS server. Allows JMP analyses to be performed on SAS data.
Browse SAS Folders
Run a SAS program or open data registered on a SAS metadata server. Reports, data, and scripts produced by SAS programs can be opened within JMP.
SAS Add-ins
Analyze JMP data tables using selected SAS procedures.
Server Connections
Manage your connections to SAS workspace and metadata servers. Allows connecting, disconnecting, and setting the active server.

New SAS Program creates a new SAS program to be run by the default SAS server.

Open SAS Program opens a SAS program file into the JMP script editor.

Open Local SAS Data imports a SAS data set into a JMP data table.

Browse SAS Data creates a JMP data table using data that resides on a SAS server.

Browse SAS Folders lets you open reports, data, and scripts produced by SAS programs in JMP. The items reside on a SAS metadata server.

SAS Add-Ins runs pre-defined SAS procedures using JMP data tables.

Server Connections Connect to and disconnect from SAS servers and set the default server.

Appendix B

Main Menu

A Description of Commands

This appendix gives an overview of commands in the JMP main menu bar, which is located at the top of the screen.

Contents

The JMP Menu (Macintosh Only) 421
The File Menu 421
The Edit Menu 424
The Tables Menu 427
The Rows Menu 428
The Cols Menu 430
The DOE Menu 432
The Analyze Menu 434
The Graph Menu 440
The Tools Menu 444
The View Menu 446
    On Microsoft Windows and Linux 446
    On Macintosh 447
The Window Menu 448
    On Microsoft Windows and Linux 448
    On Macintosh 449
The Help Menu 450
The Layout Menu 451

The JMP Menu (Macintosh Only)

About JMP

Opens the About window, which contains the release, the copyright, the operating system, and the JMP license owner.

U.S. Government Notice

Displays the restricted rights notice.

Preferences

Lets you change start-up items, analysis destination, output information, table styles, fonts, graphic formats, and more. See "Personalizing JMP," p. 329, for details of the **Preferences** command.

Services

JMP does not support the **Services** menu.

Hide JMP

Hides all JMP windows and brings the most recently used application to the foreground.

Hide Others

Hides the windows of all other running applications.

Show All

Brings all open applications into view.

Quit JMP

Closes all JMP windows, enabling you to review and/or save modified documents, and quits JMP.

The File Menu

The File menu has commands that perform file management or affect the JMP environment.

New

Reveals a submenu with options to create a new data table or a new script window. The submenu contains:

Data Table Opens an empty untitled data table. See "Creating New Data Tables," p. 10, for details.

Script Opens a new empty script window, which is an editable text window to enter and submit JMP Scripting Language (JSL) commands.

Journal Opens an empty journal window. See "Creating Journals," p. 38, for details.

Project Opens the Projects pane on the left side of JMP and opens an empty project. See "Working with JMP Projects (Windows Only)," p. 124 in the "Saving Tables, Reports, and Sessions" chapter.

Open

The **Open** command displays a specialized open file window to locate the file you want to open and specify the file format of the incoming file. The Open window displays information appropriate for the incoming file type. The **Open** command directly reads JMP data tables, JMP journal files, JMP script files, SAS data sets, SAS transport files, text files with any column delimiter, and Microsoft Excel files. On Windows, it also opens Windows menu files, which are created when you modify the JMP main menu and save the results (they are saved as .jmpmenu). See "Opening Existing JMP Files," p. 11, for details of the **Open** command.

Open Recent

This is available on Macintosh and Linux only.

Reveals a submenu that lists the JMP tables and scripts most recently opened. When you click a table name in this list, JMP opens the table. When you click a script name in this list, JMP opens the script. Some scripts automatically run. To open these scripts without running, hold the CTRL key (hold the OPTION key on Macintosh) while making the selections.

Close

Closes the active window. It is the same as clicking the close box of the active window.

On the Macintosh, the **Close** command on the **File** menu closes the active window. Holding the OPTION key and selecting **File** displays the **Close All** command, which closes all data tables. Additionally, you can hold the OPTION key and click the close box to close all data tables.

Import as Data

Writes an open text file to a JMP data table. See "Importing Text as Data," p. 21, for details.

Save

Writes the active data table, journal, or layout to a file. See "Saving Data Tables," p. 109, and "Saving Reports," p. 114, for details.

Save As

Writes the active data table, journal, or layout to a file after prompting you for a name and file type. See "Saving Data Tables," p. 109, for details about saving tables and "Saving Reports," p. 114, for details about saving reports.

On the Macintosh, Holding the OPTION key and selecting **File** displays the **Save Selection As** command for saving highlighted graphics from a data table, report, journal, or layout as a PNG graphic. On Windows and Linux, the **Save Selection As** command is located in the **Edit** menu.

Revert (Windows/Linux) or File > Revert to Saved (Macintosh)

Restores the current data table to its condition when it was last saved. This command is dimmed on the **File** menu unless a data table has been edited.

Export (Macintosh Only)

Exports data into text, Microsoft Excel, and SAS Transport file formats. See "Saving as a Text File," p. 110 and "Saving as a SAS Transport File," p. 111.

Database

Opens a connection to any database on your system that has an ODBC driver. See "Opening Data from a Database," p. 26, and "Saving Data Tables to a Database," p. 113, for details. Selecting **File >Database** reveals a submenu with options to open or save to any database on your system that has an ODBC driver. The submenu contains:

Open Table Displays the Database Open Table window, which lets you connect to a database from which you want to open a table.

Save Table Displays the Database Save Table window, which lets you connect to a database. You can then save the data table to this location.

Internet Open

Lets you open an Internet browser within JMP. See "Opening Remote Files," p. 36, for details.

Preferences

Opens the Preference Settings window, which lets you set preferences for start-up options, graph defaults, colors, fonts, file locations, and so on. For more information about customizing JMP using the Preference Settings window, see the chapter "Personalizing JMP," p. 329.

Print

Prints the active window. It displays the standard window for printing. The appearance of the window depends on your operating system and printer driver. See "Printing Reports," p. 177, for details.

Print Preview

(Windows only) Displays the active window in the form it will print. **Print Preview** is dimmed on the **File** menu unless there is an open window.

Print Setup (Windows) or Page Setup (Macintosh)

Displays the standard window for setting printed page characteristics. The form of the window depends on your operating system and current printer driver.

Send

(Windows only) Submits reports and data tables to the e-mail application you define. See "E-mailing Tables and Reports (Windows Only)," p. 38, for details.

Recent Files

(Windows only) Reveals a submenu that lists the JMP tables, scripts, and journals most recently opened. When you click a table name in this list, JMP opens the file.

Save Session Script

Creates a JSL script to re-open all currently open files and re-run all currently open analyses and graphs.

Exit

(Windows and Linux) Closes all JMP windows (prompting you to save changes) and quits the JMP application. On the Macintosh, the **Quit** command is located in the JMP menu.

The Edit Menu

The Edit menu contains standard commands that operate on selected rows and columns, on selected areas of reports, on scripts and text, and on selected formula elements in the formula editor. The commands operate on entire rows if no columns are selected. Likewise, they operate on whole columns if no rows are selected. When both rows and columns are selected, **Edit** commands affect the subset of values defined by the intersection of those rows and columns.

The Edit menu in conjunction with JMP tools can be used to copy all or part of active analysis report windows. See "The Tools Menu," p. 444, for details.

Undo

Cancels the effect of the most recent reversible **Edit**, **Rows**, or **Columns** command. Most destructive data table operations (such as cut, paste, or delete rows) are reversible. **Undo** dims when the most recent command is irreversible.

Redo

Reverses the effect of the **Undo** command in the Script Editor.

Cut

Copies selected fields from the active data table to the clipboard and replaces them with missing values. It is equivalent to **Copy**, and then **Clear**. You can also use the **Cut** command to copy all or part of a report. However, **Cut** works like **Copy** in reports; it does not clear the copied image.

Copy

Copies the values of selected data cells from the active data table to the clipboard. It captures graphs and tables in reports defined by the area selection tool ( ) in the **Tools** menu.

Copy as Text

Copies all text (no graphs) from the active report window as unformatted text on the clipboard. On the Macintosh, the **Copy as Text** command appears only when applicable.

Copy with Column Names

Preserves the data table's column labels in the copied image. Use Shift-**Paste with Labels** (**Paste with Column Names** on the Macintosh) to paste the information into a new column with the column name intact. See "Copying, Cutting, and Pasting," p. 79, for details.

Paste

Pastes information from the clipboard to the selected area in a JMP data table. **Paste** can be used with the **Copy** command to duplicate rows, columns, or any subset of cells defined by selected rows and columns.

Paste with Column Names

Uses the first line of information about the clipboard as column headings.

Clear (Windows/Linux), Edit > Delete (Macintosh)

Clears all selected cell values from the active data table and replaces them with missing values. The values are not copied to the clipboard.

Select All

When a data table is the active window, the **Select All** command selects (highlights) all the rows in the current data table. When a report, a layout, or a journal is the active window, **Select All** selects points on plots or all the objects in the layout or journal window.

Save Selection As

On Windows, the **Save Selection As** command saves highlighted portions of an analysis window in a graphic format. On the Macintosh, Option-**File** displays the **Save Selection As** command. See "Saving Parts of a Report in a Graphic Format," p. 121, for details.

Encrypt Script and Decrypt Script

Places a cryptic encoding in your script so it can be opened and/or run only if the person opening the script has a password. For details, see the *JMP Scripting Guide*.

Run Script

Submits a text file containing JMP Scripting Language (JSL) commands. You create a JSL script in one of two ways:

- Select **File > New > Script** and manually type JSL commands.
- Complete an analysis, click a report's red triangle icon, and select **Save Script to Script Window**. This lets you save a script that describes the whole analysis report or a part of the report. To submit a portion of a script, first drag to highlight the portion you want and then select **Edit > Run Script**. If no script commands are highlighted, the entire script is submitted.

See the *JMP Scripting Guide* for details.

Stop Script

Stops running a JSL script. It appears when a script is running.

Import as Data

Writes an open text file to a JMP data table. See "Importing Text as Data," p. 21, for details.

Search

Gives you the ability to find and replace text in data tables (including column names) and scripts in the usual way found in most word processing and editing programs. See "Using the Search/Find Command," p. 94, for details.

Go to Line

When a script window is open, the **Go to Line** command displays a window that lets you enter the line number of the script, and then sets the edit focus on that line.

Balance

Selects everything all text within a pair of brackets that include the cursor.

Journal

Saves a report just as it appears in the report window. See "Saving Using the Journal Command," p. 116, for details.

Layout

Lets you edit or manipulate the report before you save, enabling you to combine several reports into one or rearrange the report elements. When a layout window is the active (front-most) window, the **Layout** menu appears between the **Edit** and **Tables** menus (Windows and Macintosh) or between the **View** and **Tables** menu (Linux). See "Saving Using the Layout Command," p. 118, and "The Layout Menu," p. 451, for details.

Customize

(Windows and Linux only) Reveals a submenu to customize menus and toolbars. **Revert to Factory Defaults** resets the menus and toolbars to the arrangement when you first installed JMP. See "Personalizing JMP," p. 329, for further discussion and examples of customizing JMP menus.

The Tables Menu

The **Tables** menu commands modify or create a new JMP table from one or more existing tables. This section gives you an overview of each **Tables** menu command.

Summary

Creates a JMP window that contains a *summary table*, which summarizes columns from the active data table, called its *source table*. See "Summarizing Columns," p. 263, for details.

Subset

Creates a new data table that is a subset of the active data table. To quickly create a subset table, highlight the rows you would like to subset, press the Shift key and select **Tables > Subset**. JMP creates a linked subset table without asking you to complete the Subset window. See "Creating a Subset Data Table," p. 223, for details about creating subsets.

Sort

Sorts a JMP data table by one or more columns. The **Sort** command displays a window for you to specify columns as sort fields. See "Sorting Data Tables," p. 225, for details.

Stack

Creates a new data table from the active table by stacking specified columns into a single new column. The values in other columns are preserved in the new data table. In addition, **Stack** creates an ID column that identifies each row in the new table with values that are the corresponding column names from the original table. **Stack** does the reverse of **Split**. See "Stacking Columns," p. 227, for details.

Split

Creates a new data table from the active table by dividing one or more columns to form multiple columns. The new columns correspond to the values (levels) of an ID variable. **Split** requires one or more columns whose combined values identify each row in the new table. See "Splitting Columns," p. 232, for details.

Transpose

Creates a new data table whose columns of the original table are the rows of the new table, and the original table rows are the new table's columns. See "Transposing Rows and Columns," p. 237, for details.

Concatenate

Creates a new data table from two or more open tables by combining them end to end. See "Concatenating Data Tables," p. 241, for details.

Join

Creates a new data table by merging (joining) two tables side by side. See "Joining Data Tables," p. 244, for details.

Update

Updates one data table with values from a second table. See "Updating a Data Table," p. 256, for details.

Tabulate

Displays descriptive statistics in tabular format. See "Tabulating Data," p. 269, for details.

Missing Data Pattern

Creates a new data table showing the pattern that the missing data in your data table creates. In the original data table, missing character data is represented with a blank and missing numerical data is represented with a black dot. See "Viewing Patterns of Missing Data," p. 73, for details.

The Rows Menu

You can access commands that affect highlighted rows from the **Rows** menu. Most of these commands can also be found by clicking the red triangle icon on the rows panel to the left of the data table or by clicking the red triangle icon in the upper left corner of the data table above the row numbers.

Exclude/Unexclude

Excludes selected rows from statistical analyses. See "Excluding Rows and Columns," p. 131, for details.

Hide/Unhide

Suppresses (hides) rows so they do not appear in plots and graphs. See "Hiding Rows and Columns," p. 132, for details.

Label/Unlabel

The **Label/Unlabel** command labels or identifies points on all scatterplots. See "Labeling Rows and Columns," p. 133, for details.

Colors

Changes highlighted points in all scatterplots to the colors you select. See "Giving Rows a Color," p. 134, for details.

Markers

Assigns a character from the JMP markers palette to replace the standard points in scatterplots and spinning plots. See "Adding Markers to Rows," p. 135, for details.

Next Selected

Locates the first selected row after the *current row* and causes it to flash. See "Locating Next and Previously Selected Rows," p. 96, for details.

Previous Selected

Behaves the same as **Next Selected** but locates the first selected row before the *current row* and causes it to flash. See "Locating Next and Previously Selected Rows," p. 96, for details.

Row Selection

Reveals a submenu with selection options:

Go to Row A specific row number

Invert Row Selection All previously deselected rows

Select All Rows All rows in a data table

Select Excluded, Hidden, or Labeled A subset of rows based on the excluded, hidden, or labeled row states

Select Where A subset based on criteria you enter

Select Matching Cells Rows in the active data table with values that are similar to the highlighted row(s)

Select All Matching Cells Rows in all open data table with values that are similar to the highlighted row(s)

Select Randomly Randomly select rows

Select Dominant Useful for Pareto charts: selects the high or low values for a column.

Name Selection in Column Use current selection to add a column using 1s and 0s to indicate the selection.

See "Selecting Rows and Columns," p. 90, for details.

Clear Row States

Clears all active row states in the data table. All rows become included, visible, unlabeled, and show in plots as black dots. It does not affect row states saved in row state columns.

Color or Mark by Column

Lets you color or mark points in plots. See "Assigning Colors or Markers to Rows According to Column Values," p. 135, for details.

Row Editor

Lets you browse or edit cells. See "Using the Row Editor," p. 81, for details.

Delete Rows

Deletes all selected rows from a JMP data table. Use the **Undo** command on the **Edit** menu to undo an accidental deletion. See "Adding and Deleting Rows," p. 66, for details.

Add Rows

Displays a window that prompts for the number of rows to add and to specify their location in the table. See "Adding and Deleting Rows," p. 66, for details.

Move Rows

Moves highlighted rows to the location you specify in the Move Rows window.

Data Filter

Lets you select rows, create subsets and animate selected (or highlighted) rows. See "The Data Filter," p. 97 in the "Entering, Editing, and Managing Data" chapter.

The Cols Menu

You can access commands that affect selected columns from the **Cols** main menu, from the Columns panel to the left of the data table, or from the triangular icon in the upper left corner of the data table.

New Column

Gives a window in which you can enter new column information, such as column name and characteristics. See "Adding and Deleting Columns," p. 67, for details.

Add Multiple Columns

Displays a window that lets you add more than one column at a time to a table. See "Adding and Deleting Columns," p. 67, for details.

Go to

Highlights a specific column in the table.

Column Info

Displays the window used by the **New Column** command, except there is no **Next** button for adding new columns. See "Assigning Properties to Columns," p. 140, for details.

Preselect Role

Assigns a role to the selected column and saves the role with the data table. See "Giving Columns a Preselected Analysis Role," p. 138, for details.

Formula

Displays the column's formula editor to create a formula that computes column values. See "Giving Columns a Formula to Compute Values," p. 142, and "Formula Editor," p. 285, for details.

Validation

Lets you set up a column so that it only accepts certain values. See "Validating Column Data," p. 144, for details.

Label/Unlabel

Is a toggle command that labels or identifies points on all scatterplots. See "Labeling Rows and Columns," p. 133, for details.

Scroll Lock/Unlock

Locks the selected column in place so when you scroll horizontally, the column remains visible. See "Locking Columns in Place," p. 138, for details.

Hide/Unhide

Is a toggle command that suppresses (hides) columns so they do not appear in plots and graphs. See "Hiding Rows and Columns," p. 132, for details.

Exclude/Unexclude

Is a toggle command used to exclude selected columns from statistical analyses. See "Excluding Rows and Columns," p. 131, for details.

Standardize Attributes

Lets you apply attributes (which include data type, modeling type, numeric format, and so on) and properties (which include formulas, lists, notes, list and range checks, and so on) to multiple columns. See "Standardizing Attributes and Properties Across Columns," p. 164, for details.

Reorder Columns

Lets you move columns according to the selection you make from its submenu:

Move Selected Columns Moves the selected columns **To first** (left-most in the data table), **To last** (right-most in the data table), or **After:** (after a column you identify) in the Move Selected Columns window.

Original Order Returns the columns to the order they were in at the time the data table was last saved.

Reorder by Name Arranges the columns (except for row state columns) from left to right in alphabetical order by column name.

Reorder By Data Type Arranges the columns from left to right in alphabetic order by data type (Character, Numeric, Row State).

Reorder By Modeling Type Arranges the columns from left to right in alphabetic order by modeling type (continuous, ordinal, nominal). Row State columns have no modeling type, and are shown last.

Reverse Order Reverses the order of the data table columns.

If you mistakenly move one or more columns, use the **Undo** command in the **Edit** menu to restore the previous order.

Delete Columns

Removes selected columns from the data table. See "Adding and Deleting Columns," p. 67, for details.

Recode

Lets you quickly recode data that is coded incorrectly (for example, contains typos or incorrect wording) so it follows a consistent format. See "Recoding Data," p. 72, for details.

Group Columns

Makes the selected columns into a group.

Ungroup Columns

Ungroups the selected group of columns.

The DOE Menu

The Design of Experiments (DOE) menu in JMP is an environment for describing the factors, responses and other specifications needed to create a designed experiment and saving them in a JMP data table. The specific designs are described briefly here and covered in detail in the *JMP Design of Experiments*.

Custom Design

Provides the most flexibility of all design choices. With this option you can have continuous factors, categorical factors with any number of levels, interactions, mixture ingredients, and covariates (factors that have unchangeable fixed values). You can construct custom-designed models that include interaction terms and polynomial terms for continuous factors. You can also specify inequality constraints on the factors, and the number of experimental runs, which can be any number greater than or equal to the number of terms in the model. See the *JMP Design of Experiments* for details.

Screening Design

Enables you to specify continuous factors, and two- and three-level categorical factors. It creates a table of classical screening designs from which you can pick. See the *JMP Design of Experiments* for details.

Response Surface Design

Lets you define a number of continuous factors. This environment then offers a table of classical response surface designs from which to select. See the *JMP Design of Experiments* for details.

Full Factorial Design

You specify a set of continuous and categorical factors with arbitrary numbers of levels. JMP creates the design containing all possible combinations of those factors. See the *JMP Design of Experiments* for details.

Mixture Design

Lets you define a set of factors that are ingredients in a mixture. JMP creates a new window for choosing among several classical mixture design approaches, such as simplex, extreme vertices, and lattice. For the extreme vertices approach, you can supply a set of linear inequality constraints limiting the geometry of the mixture factor space. See the *JMP Design of Experiments* for details.

Choice Design

Creates experiments with factors that are product attributes. Lets you find the combination of attributes for a particular product or service that your customers rate highly. See the *JMP Design of Experiments* for details.

Space Filling Design

Creates a design by spreading the design points out to the maximum distance possible between two points. Prevents replicate points and spaces them uniformly. See the *JMP Design of Experiments* for details.

Nonlinear Design

Lets you create an optimal design for models that are nonlinear in the parameters. See the *JMP Design of Experiments* for details.

Taguchi Arrays

Guides you through the definition of signal and noise factors. The signal factors form the inner array and the noise factors form the outer array. The inner and outer array designs are the traditional Taguchi orthogonal arrays, such as L4, L8, L16, and so on. See the *JMP Design of Experiments* for details.

Augment Design

Lets you modify existing designs. You can add center points, replicate the design a specified number of times, create a foldover design, and add runs to the design using a model with more terms than the original design. See the *JMP Design of Experiments* for a discussion of each type of design, with details and examples.

Sample Size and Power

Computes power, sample size, or the effect size you want to detect for a given alpha and error standard deviation. You supply two of these values and the sample size and power feature computes the third. If you supply only one of these values, the result is a plot of the other two. This feature is available for the single-sample, two-sample, and *k*-sample situations. See the *JMP Design of Experiments* for a discussion of prospective power analysis and examples.

The Analyze Menu

Each **Analyze** command launches a platform. A *platform* is an interactive window you use to analyze data, work with points on plots, and save results. The reports in a JMP analysis are organized hierarchically. Methods unfold that suit the context of your data. Many results appear automatically, and more are offered through drop-down menus.

Distribution

Choosing **Distribution** launches the Distribution platform, which describes a distribution of values with histograms and other graphical and textual reports:

- Continuous columns display a histogram and box plots. You can test the mean and standard deviation of the distribution and select from a variety of distribution fits. For continuous variables, capability analysis is available.
- Nominal or ordinal columns are shown with a histogram of relative frequency for each level of the ordinal or nominal variable. You have the option to view a mosaic (stacked) bar chart as well as options to test probabilities.

"Univariate Analysis" in the *JMP Statistics and Graphics Guide* covers the **Distribution** command in detail and gives examples.

Fit Y by X

Fit Y by X studies the relationship of two variables. This platform shows plots with accompanying analyses for each pair of *x* and *y* variables. The type of analysis done depends on the modeling types (continuous, nominal, or ordinal) of the *x* and *y* columns.

- If both *x* and *y* have continuous modeling types, **Fit Y by X** displays a scatterplot. Using options, you can explore various regression fits for the data and select the most suitable fit for further analysis. Each fit is accompanied by tables with supporting statistical analyses and parameter estimates.
- If *x* is nominal or ordinal and *y* is continuous, **Fit Y by X** plots the distribution of *y*-values for each discrete value of *x*. You can use options to see means diamonds and a box plot for each *x*-value and to compare group means with comparison circles. Accompanying text reports show a one-way analysis of variance table. Also, you can request nonparametric analyses, view multiple comparisons, and test homogeneity of variance.
- If *x* has continuous values and *y* has nominal or ordinal values, **Fit Y by X** performs a logistic regression and displays a family of logistic probability curves. Tables show the log likelihood analysis and parameter estimates for each curve.

Note: Logistic regression of ordinal columns is parameterized differently from logistic regression of nominal columns and sometimes produces different results.

- If both *x* and *y* are nominal or ordinal values, **Fit Y by X** shows a contingency table and a mosaic bar chart. Accompanying tables show statistical tests, frequency, proportion, and Chi-squared values for each cell. Also, you can request a correspondence analysis.

Individual chapters in the *JMP Statistics and Graphics Guide* describe each type of analysis given by the **Fit Y by X** command.

Matched Pairs

The **Matched Pairs** command handles bivariate data in the special situation where the two responses form a pair of measurements coming from the same experimental unit or subject. For example, a matched pair might be a before-and-after blood pressure measurement from the same subject. The responses are correlated, and the statistical method called the paired *t*-test takes that into account.

The Matched Pairs platform displays the data as a scatterplot of the difference between each pair (*y*) by the mean of each pair (*x*) and includes the standard paired *t*-test, which is equivalent to testing that the mean difference between the paired values is zero. See the *JMP Statistics and Graphics Guide* for details.

Fit Model

Fit Model lets you tailor an analysis using a model specific for your data. You select columns, assign roles, and build the model to fit in the Fit Model window.

Fit Model fits one or more *y* variables to a model of *x* variables. You select the type of model appropriate to your data from the menu of fitting *personalities* given in the Fit Model window. The fitting personalities available depend on the type of responses you select. The following list briefly describes the different fitting techniques:

Standard Least Squares Gives a least squares fit for a single continuous response, accompanied by leverage plots and an analysis of variance table.

Screening Produces an exploratory screening analysis for single or multiple *y* columns with continuous values.

Stepwise Gives a stepwise regression for a single continuous or categorical *y* and all types of effects.

Manova Performs a multivariate analysis of variance for multiple continuous response columns. **Manova** displays a window that lets you fit multivariate models interactively.

Loglinear Variance Is for a single continuous response and estimates parameters that optimize both a mean and a variance.

Nominal Logistic Fits a single nominal response with nominal regression by maximum likelihood.

Ordinal Logistic Fits a single ordinal response with ordinal cumulative logistic regression by maximum likelihood.

Proportional Hazard Performs a proportional hazard (Cox) model fit for survival analysis of censored data with a single continuous response.

Parametric Survival Tests the fit of an exponential, Weibull, or lognormal distribution.

Generalized Linear Model Provides a unified way to fit responses that don't fit the usual requirements of least squares fits, such as frequency counts.

Individual chapters in the *JMP Statistics and Graphics Guide* document each technique offered by the model fitting platform.

Modeling

The **Modeling** command has a submenu that launches these platforms:

Screening Helps select a model to fit to a two-level screening design by showing which effects are large. For details, see the *JMP Statistics and Graphics Guide*.

Nonlinear Fits nonlinear models, which are models that are nonlinear in their parameters. You orchestrate the fitting process as a coordination of three important parts of JMP: the data table, the formula editor, and the Nonlinear platform.

You define the nonlinear prediction formula with the formula editor. Then select **Nonlinear** with the response variable as *y* and the model column with its fitting formula in the *x* role. You interact with the platform through the Nonlinear Fitting control panel using:

- Buttons to start, stop, and step through the fitting process, and to reset parameter values
- Fitting options to specify loss functions and computational methods
- A processing messages area
- A list of current and limit convergence criteria and step counts, current parameter estimates, and error sum of squares
- Options to specify the alpha level for confidence intervals and delta for numerical derivatives

The Nonlinear platform can show the model and the derivatives of the model with respect to each of its parameters, and the fitting solution reports. There are features that give confidence intervals on the parameters and plot the resulting function if it is of a single variable. You can also save the SSE values in a data table with a grid for plotting them. The chapter "Nonlinear Regression" of *JMP Statistics and Graphics Guide* describes the **Nonlinear** command in detail and gives examples.

Neural Net Is a standard type of neural network. It is a particular case of a back propagation feed-forward multilayer-perception neural net. The neural network is a set of nonlinear equations that predict output variables (*y*) from input variables (*x*) in a flexible way using layers of linear regressions and S-shaped functions. JMP fits the neural net using standard nonlinear least squares regression methods. See the *JMP Statistics and Graphics Guide* for details.

Gaussian Process Models the relationship between a continuous response and one or more continuous predictors. These models are common in areas like computer simulation experiments, such as the output of finite element codes, and they often perfectly interpolate the data. Gaussian processes can deal with these no-error-term models.

The Gaussian Process platform fits a spatial correlation model to the data, where the correlation of the response between two observations decreases as the values of the independent variables become more distant.

The main purpose for using this platform is to obtain a prediction formula that can be used for further analysis and optimization. For details, see the *JMP Statistics and Graphics Guide*.

Partition Recursively partitions rows into groups according to *x* values that associate with *y* values. This partitioning creates a tree of partitions.

The factor columns (*x*) can be either continuous or categorical (nominal or ordinal). If an *x* is continuous, then the splits (partitions) are created by a *cutting* value, which divides the sample into values below and values above this cutting value. If the *x* is categorical, then the sample is divided into two groups of levels.

The response column (*y*) can be either continuous or categorical (nominal or ordinal). If *y* is continuous, then the platform fits means, and creates splits which most significantly separate the

means by the sums of squares due to the means differences. If *y* is categorical, then the response rates become the fitted value. The most significant split can be determined by the largest likelihood ratio Chi-squared statistic. In either case, the split is chosen to maximize the difference in the responses between the two. See the *JMP Statistics and Graphics Guide* for details.

Time Series Lets you explore, analyze, and forecast univariate time series. The time series platform also supports Transfer Function Models.

The launch window (role assignment window) requires that one or more continuous variables be assigned as the time series. Also, you can specify a time ID variable, which is used to label the time axis. If a time ID variable is specified it must be continuous, sorted ascending, and evenly spaced with no missing values.

The analysis begins with a plot of the points in the time series. In addition, the platform displays graphs of the autocorrelations and partial autocorrelations of the series. These indicate how and to what degree each point in the series is correlated with earlier values in the series. You can interactively add:

- Variograms—characterizations of process disturbances
- AR coefficients—autoregressive coefficients
- Spectral density plots—period and frequency plots with white noise tests

These graphs can be used to identify the type of model appropriate for describing and predicting (forecasting) the evolution of the time series. The model types include:

- ARIMA—autoregressive integrated moving average, often called Box-Jenkins models
- Seasonal ARIMA—ARIMA models with a seasonal component
- Smoothing Model—several forms of exponential smoothing and Winters Method

See the *JMP Statistics and Graphics Guide* for details.

Categorical Tabulates and summarizes categorical response data, including multiple response data, and calculates test statistics. It is designed to handle survey and other categorical response data, including multiple response data like defect records, side effects, and so on. For details, see the *JMP Statistics and Graphics Guide*.

Choice Lets you analyze the preference structure of consumers in order to design products and services that have the attributes most desired by consumers.

Multivariate Methods

The **Multivariate Methods** submenu has the commands shown above that launch the following platforms:

Multivariate Explores how multiple variables relate to each other and how points fit that relationship. This platform helps you see correlations between two or more response (*y*) variables, look for points that are outliers, and examine principal components to look for factors.

The multivariate platform appears showing correlations and a scatterplot matrix. Options give:

- Inverse, partial, nonparametric, and pairwise correlations with accompanying bar charts.
- A matrix of bivariate scatterplots with a plot for each pair of *y*-variables.
- A Mahalanobis distance outlier plot.
- A jackknife multivariate distance outlier plot where the distance for each point is calculated excluding the point itself.

There are options with these plots to save the distance scores.

You can also request principal components, standardized principal components, rotation of a specified number of components, and factor analysis information.

The chapter "Correlations and Multivariate Techniques of *JMP Statistics and Graphics Guide* describes the **Multivariate** command.

Cluster Clusters rows of a JMP data table. **Cluster** can perform a hierarchical or a *k*-means clustering method. The hierarchical cluster platform displays results as a tree diagram of the clusters called a dendrogram followed by a plot of the distances between clusters. The dendrogram has a sliding cluster selector that lets you identify the rows in any size cluster. There are options to save the cluster number of each row. Hierarchical clustering uses these clustering methods:

- Average linkage computes the distance between two clusters as the average distance between pairs of observations, one in each cluster.
- Centroid method computes the distance between two clusters as the squared Euclidean distance between their means.
- Ward's minimum variance method (the default) uses the distance between two clusters as the ANOVA sum of squares between the two clusters added over all the variables.
- Single linkage uses the distance between two clusters that is the minimum distance between an observation in one cluster and an observation in the other cluster.
- Complete linkage uses the distance between two clusters that is the maximum distance between an observation in one cluster and an observation in the other cluster.
- Fast Ward is a method of applying the Ward's minimum variable method more quickly for large numbers of rows. It is used automatically whenever there are more than 2000 rows.

The *k*-means clustering approach finds disjoint clusters on the basis of Euclidean distances computed from one or more quantitative variables. Every observation belongs to only one cluster—the clusters do not form a tree structure as with hierarchical clustering. You specify the number of clusters you want.

The cluster platform also has options to do normal mixture clustering and SOMs (self-organizing maps).

The chapter "Clustering" of *JMP Statistics and Graphics Guide* describes the **Cluster** command in detail and shows clustering examples.

Principal Components Derives a small number of independent linear combinations (principal components) of a set of variables that capture as much of the variability in the original variables as possible. JMP also offers several types of orthogonal and oblique Factor-Analysis-Style rotations to help interpret the extracted components.

For details, see the *JMP Statistics and Graphics Guide*.

Discriminant Provides a method of predicting the level of a one-way classification based on known values of the responses. The technique is based on how close a set of measurement variables are to the multivariate means of the levels being predicted. Also, you can do stepwise discriminate analysis. See the *JMP Statistics and Graphics Guide* for details.

PLS (Partial Least Squares) Fits models using the partial least squares (PLS) method that balances the two objectives of explaining response variation and explaining predictor variation. The PLS techniques work by extracting successive linear combinations of the predictors, called *factors* (also called *components* or *latent vectors*) that address one or both of these two goals. The PLS platform in JMP also enables you to select the number of extracted factors by cross validation, which involves fitting the model to part of the data and minimizing the prediction error for the unfitted part. See the *JMP Statistics and Graphics Guide* for details.

Item Analysis Enables you to estimate parameters for test items using Item Response Theory (IRT). Also, choosing this enables you to access logistic 1PL, 2PL, and 3PL models.

Reliability and Survival

The **Reliability and Survival** submenu has a submenu with the following commands:

Life Distribution Lets you can find the most suitable distributional fit for your data and make predictions. Weibull, Lognormal, Fréchet, Extreme Value, and other common distributions used in Reliability and Survival analysis are included.

Fit Life by X helps you analyze lifetime events when only one factor is present.

Recurrence Analysis Looks at the age of a system when it requires a repair. A system can have multiple repairs, each with its associated age, and is followed until it is no longer in service. A typical system might be some component of an engine or appliance.

Survival Performs a univariate survival analysis using product-limit life table survival computations with estimation of Weibull, lognormal, and exponential parameters.

Fit Parametric Survival Launches the Fit Model window, with the Parametric Survival fitting personality in effect. The analysis tests the fit of an exponential, Weibull, or lognormal distribution.

Fit Proportional Hazards Launches the Fit Model window, with the Proportional Hazards fitting personality in effect. This regression analysis fits a Cox model.

Note: You can also use the Nonlinear platform to handle nonlinear models with loss functions for other parametric survival modeling. See the *JMP Statistics and Graphics Guide* for details.

The Graph Menu

Graph menu commands produce windows that contain specialized graphs or plots with supporting tables and statistics. For a detailed discussion of each **Graph** menu command, see the *JMP Statistics and Graphics Guide*.

Graph Builder

The **Graph Builder** command provides an interactive display of both continuous and categorical data. A variety of graph elements are available (scatterplots, box plots, histograms, bar charts, lines, smoothers) for studying univariate and multivariate relationships. Data can be partitioned by both continuous and categorical variables to readily see interactions.

Chart

The **Chart** command gives a chart for every numeric *y* variable specified where the *y*'s are statistics to chart. The *x* values are always treated as discrete values. By default, a vertical bar chart appears, but there are options to show horizontal bar charts, line plots, step charts, needle charts, point charts, or pie charts.

You can specify up to two *x* variables for grouping on the chart itself. The first *x* is the group variable, and the second *x* is the level (subgroup) variable. If there is no *x* variable, then each row is a bar. The chapter "Bar, Line, and Pie Charts" of *JMP Statistics and Graphics Guide* describes the **Chart** command and shows examples.

Overlay Plot

The **Overlay Plot** command gives an overlay of a single numeric or categorical *x* column and all specified numeric *y* variables. The axis can have either a linear or a log scale. Also, the plots for each *y* can be shown separately, with or without a common *x*-axis.

By default, the values of the *x* variable are in ascending order, and the points are plotted in that order. You have the option of plotting the *x* values as they are encountered in the data table.

Note: For scatterplots of two variables with regression fitting options, use the **Fit Y by X** command instead of **Overlay Plot**.

The chapter "Overlay Plots" of *JMP Statistics and Graphics Guide* describes the **Overlay Plot** command in detail and shows examples of plotting data.

Scatterplot 3D

Scatterplot 3D produces a three-dimensional spinnable display of values from any three numeric columns in the active data table. It also produces an approximation to higher dimensions through principal components, standardized principal components, rotated components, and biplots. There are options to save principal component scores, standardized scores, and rotated scores.

The Scatterplot 3D platform also gives factor-analysis-style rotations of the principal components to form orthogonal combinations that correspond to directions of variable clusters in the space. The method used is called a *varimax rotation,* and is the same method that is traditionally used in factor analysis.

See the *JMP Statistics and Graphics Guide* for details about the **Scatterplot 3D** command and examples of plotting data and computing principal components.

Contour Plot

The **Contour Plot** command constructs a contour plot for one or more response variables, *y*, for the values of two *x* variables. **Contour Plot** assumes the *x* values lie in a rectangular coordinate system, but the observed points do not have to form a grid. Some contour plot options are:

- Show or hide data points
- Show or hide triangulation and boundary
- Specify and label levels
- Show a line contour or fill areas

The chapter "Contour Plot" of *JMP Statistics and Graphics Guide* describes the **Contour Plot** command in detail and shows examples of plotting data.

Bubble Plot

A **Bubble Plot** is a scatter plot which represents its points as circles (bubbles). Also, the bubbles can be sized according to a another column, colored by another column, aggregated across groups defined by one or more other columns, and dynamically indexed by a time column. With the opportunity to see up to five dimensions at once (*x* position, *y* position, size, color, and time), bubble plots can produce dramatic visualizations and make interesting discoveries easy. For details, see the *JMP Statistics and Graphics Guide*.

Parallel Plot

The **Parallel Plot** command draws a parallel coordinate plot, which shows connected line segments representing each row of a data table.

Cell Plot

Produces a rectangular array of cells drawn with a one-to-one correspondence to data table values.

Tree Map

The **Tree Map** command displays tree maps, which can be thought of as bar charts that have been folded over in two dimensions, leaving no unused space. It is useful when there are a lot of categories. Tree maps are a graphical technique of observing patterns among groups that have many levels. They are especially useful in cases where histograms are ineffective.

Scatterplot Matrix

The **Scatterplot Matrix** command enables quick production of scatterplot matrices. These matrices are orderly collections of bivariate graphs, assembled so that comparisons among many variables can be conducted visually. In addition, the plots can be customized and decorated with other analytical quantities (like density ellipses) to enable for further analysis.

These matrices can be square, showing the same variables on both sides of the matrix or triangular, showing only unique pairs of variables in either a lower or upper triangular fashion. In addition, you

can specify that different variables be shown on the sides and bottom of the matrix, giving maximum flexibility for comparisons. For details, see the *JMP Statistics and Graphics Guide*.

Ternary Plot

The **Ternary Plot** command constructs a plot using triangular coordinates. The ternary platform uses the same options as the contour platform for building and filling contours. In addition it a specialized crosshair tool that lets you read the triangular axes values.

The chapter "Ternary Plots" of *JMP Statistics and Graphics Guide* describes the **Ternary Plot** command in detail and shows ternary plot examples.

Diagram

The **Diagram** platform is used to construct *Ishikawa charts*, also called *fishbone charts*, or *cause-and-effect diagrams*. These charts are useful when organizing the sources (causes) of a problem (effect), perhaps for brainstorming, or as a preliminary analysis to identify variables in preparation for further experimentation. See the *JMP Statistics and Graphics Guide* for examples of Ishikawa charts.

Control Chart

The **Control Chart** menu has a sub-menu that creates dynamic plots of sample subgroups as they are received and recorded. Control charts are a graphical analytic tool used for statistical quality improvement. Control charts can be broadly classified according to the type of data analyzed:

- Control charts for variables are used when the quality characteristic to be analyzed is measured on a continuous scale.
- Control charts for attributes are used when the quality characteristic is measured by counting the number of nonconformities (defects) in an item or by counting the number of nonconforming (defective) items in a sample.

The concepts underlying the control chart are that the natural variability in any process can be quantified with a set of control limits, and that variation exceeding these limits signals a special cause of variation. In industry, control charts are commonly used for studying the variation in output from a manufacturing process. They are typically used to distinguish variation due to special causes from variation due to common causes.

The control chart platform offers the following types of charts:

- Mean, range, and standard deviation
- Individual measurement and moving range (run chart, XBar Chart, and IR)
- *P*-chart, *NP*-chart, *C*-chart, and *U*-chart
- UWMA and EWMA
- CUSUM
- Presummarized
- Levey-Jennings
- Multivariate Control Charts

The "Statistical Control Charts" of *JMP Statistics and Graphics Guide* describes the **Control Charts** command in detail.

Variability/Gauge Chart

In a variability analysis, a number of parts assumed to be identical are taken from a production line. Each one is measured several times by a number of operators using different measuring instruments. You want to know the magnitudes of the variation due to operators, parts, and instruments. In the same way that a Shewhart control chart can identify processes which are going out of control over time, a variability chart can help identify operators, parts, and instruments.

Variability or Continuous Gauge charts are for responses whose values can be measured on a continuous scale. For example, the width of a washer might be measured as 2.3 mm.

Attribute Gauge charts are for responses whose values are binary or categorical. For example, a circuit might be measured as pass/fail. Because different reports are generated on the raters, raters each need to be in different columns. The chapter "Variability Charts" of *JMP Statistics and Graphics Guide*describes the **Variability/Gauge Chart** command in detail.

Pareto Plot

The **Pareto Plot** command creates a bar chart (Pareto chart) that displays the severity (frequency) of problems in a quality-related process or operation. Pareto plots compare quality-related measures or counts in a process or operation. The defining characteristic of Pareto plots is that the bars are in descending order of values, which visually emphasizes the most important measures or frequencies.

Pareto Plot uses a single *y* variable, called a process variable, and gives:

- A simple Pareto plot when you do not specify an *x* (classification) variable
- A one-way comparative Pareto plot when you specify a single *x* variable
- A two-way comparative plot when there are two *x* variables

The **Pareto Plot** command does not distinguish between numeric and character variables or between modeling types. All values are treated as discrete, and bars represent either counts or percentages.

The chapter "Pareto Plots" of *JMP Statistics and Graphics Guide* describes the **Pareto Plot** command in detail.

Capability

Capability analysis, used in quality control, measures the conformance of a process to given specification limits. Using these limits, you can compare a current process to specific tolerances and maintain consistency in production. Graphical tools such as the goal plot and box plot give you quick visual ways of observing within-spec behaviors. For details, see the *JMP Statistics and Graphics Guide*.

Profiler

The **Profiler** is available for tables with columns whose values are computed from model prediction formulas. Usually, a profiler plot results when you do a Standard Least Squares analysis and then request it. However, if you save the prediction equation from the analysis, you can access the prediction profile later from the **Graph** menu and look at the model using the response column with the saved prediction formula.

The prediction profiler displays *prediction traces* for each *x* variable. A prediction trace is the predicted response as one variable is changed while the others are held constant at the current values. The prediction profiler is a way of changing one variable at a time and looking at the effect on the predicted

response. You interact with the prediction profiler; as you vary the value of an *x* variable, the prediction profiler recomputes:

- The low and high values show on the *x*-axis for each factor, showing its current value.
- The current predicted value of each *y* variable for the current values of the *x* variables.
- Lines and markers within the prediction plots show how the predicted value changes when you change the current value of an individual *x* variable and include the 95% confidence interval for the predicted values shown by error bars above and below each marker.

Prediction profiles are useful in multiple-response models to help judge which factor values can optimize a complex set of criteria. See the *JMP Statistics and Graphics Guide* for details.

Contour Profiler

The **Contour Profiler** command works the same as the **Profiler** command. It is usually accessed from the Fit Model platform when a model has multiple response. However, if you then save the prediction formulas for the responses, you can access the Contour Profiler at a later time from the **Graph** menu and specify the columns with the prediction equations as the response columns. See the *JMP Statistics and Graphics Guide* for examples of the Profiler and the Contour Profiler.

Surface Plot

The **Surface Plot** command plots surfaces and points in three dimensions based on formulas or data. The *JMP Statistics and Graphics Guide* describes the **Surface Plot** in detail and shows examples.

Custom Profiler

The **Custom Profiler** command is available for tables with columns whose values are computed from model prediction formulas. The Custom Profiler is useful in multiple-response models to help judge which factor values can optimize a complex set of criteria. The *JMP Statistics and Graphics Guide* describes the **Custom Profiler** in detail and shows examples.

The Tools Menu

The **Tools** menu are palettes of special tools whose form the cursor can take. There are general tools and specific graphics tools that operate on points in plots. The default tool is the arrow. Click a tool in the Tools menu to activate it.

Arrow

The cursor is the standard arrow when it is in the panels area to the left of the data table, in the triangular rows and columns area in the upper left corner of the data grid, or on the title bar of the tables panel. Also, click and drag with the arrow to select points in plots. Outside of plots, click and drag to draw a temporary line. When you release, the line disappears.

Help

The question mark icon accesses the JMP Help system. Select the help tool and then click a place in a data table or report on which you need assistance. Context-sensitive help tells about the items located near the location of your click.

Selection

Use the large plus (selection tool) to select rows and columns in the data table or areas of a report. When you click, the row or column is highlighted. Click and drag to highlight multiple rows and columns, and Ctrl-click (Command-click on the Macintosh) to select discontinuous rows or columns. Clicking near the edge of the report highlights the entire report. To deselect, click a second time in a highlighted area.

Scroller

Drag the scroller tool to scroll reports up or down and show only the results you want to see. The scroller is a precise way to perform the same function as the vertical and horizontal scroll bars. The scroller reverts to the arrow after one click. Press and hold the Shift key while selecting the scroller to have the cursor continue to have the scroller form after multiple clicks.

Grabber

The hand (grabber) tool is for direct manipulation of plots, charts, axes, and formula components. Use the hand tool to change the displayed range of axis values. On a *y*-axis, dragging or scales the *y*-axis; dragging scrolls the *y*-axis. On an *x*-axis, dragging scrolls the *x*-axis; dragging or scales the *x*-axis.

Brush

The brush tool is for highlighting an area of points in plots. When you click, a rectangle appears. Move the rectangle over points to highlight them. Shift-click to extend the selection. Alt-click (Option-click on the Macintosh and Alt-Shift-click on Linux) to change the size of the selection rectangle and also extend the selection. See "Selecting a Rectangular Area of Points," p. 185, for details.

Lasso

The lasso tool lets you highlight an irregular area of points in plots. Drag the lasso around any set of points. When you release the lasso, it automatically closes and highlights the points within the enclosed area. See "Selecting an Irregular-Shaped Area of Points," p. 186, for details.

Magnifier

The magnifier (zoom) tool lets you automatically zoom in on any area of a plot. When you click the magnifier, the point or area where you click becomes the center of a new view of the data. Alt-click

(Option-click on the Macintosh) to restore the original plot. On a ternary plot, drag the magnifier tool to zoom the triangular axes.

Crosshairs

The crosshairs tool is a movable set of axes used to measure points and distances in graphs. The values where the crosshairs intersect the vertical and horizontal axis appear automatically as you drag the crosshairs within a plot. On a ternary plot, this tool displays triangular crosshair lines.

Annotate

The annotate tool adds editable text notes to a JMP report, journal, or layout window. See "Adding an Annotative Note," p. 211, for details. The annotate tool reverts to the arrow after one click. Press and hold the Shift key while selecting the annotate tool to have the cursor continue to have the annotate form after multiple clicks.

Line, Polygon, and Simple Shape

The line, polygon, and simple shape tools add editable lines, polygons, and simple shapes (ovals or rectangles) to a JMP report, journal, or layout window. See "Adding Shapes," p. 213, for details. The shape tools revert to the arrow after one click. Press and hold the Shift key while selecting the shape tool to have the cursor continue to have the shape form after multiple clicks.

The View Menu

The **View** menu lets you view or hide certain windows or panes.

On Microsoft Windows and Linux

On Windows and Linux, you find these commands in the **View** menu:

JMP Starter

The **JMP Starter** command opens and closes the JMP Starter. You can also close the JMP Starter with **File > Close** when it is the active window or by clicking its close box. On the Macintosh, the **JMP Starter** command is located in the **Window** menu. For more details, see "The JMP Starter Window," p. 10.

Window List (Windows and Linux only)

The Window List command displays a pane at the left side of the JMP window that lists the name of each window you have open in JMP. Right-click the title of a window in the list to close, rename, redraw, or hide it. For more details, see "The Window List (Windows Only)," p. 332.

File System (Windows and Linux only)

The File System command displays a pane at the left side of the JMP window that shows your PC's file system. You can drag and drop files from here into a project.

Projects (Windows and Linux only)

The File System command displays a pane at the left side of the JMP window that lists all open projects.

Log

The **Log** command displays a pane at the bottom of the JMP window that monitors JSL statements (JSL scripts) as they execute. The log window is editable. For example, you can use the log to locate errors in the script, correct the code, copy it and paste it back into the script window, submit the corrected script. To detach or re-attach the log window to the bottom of the screen, right-click it and select **Float Log Window** or **Dock Log Window**.

Show Toolbars

The **Show Toolbars** command displays a window that lists all available toolbars with a check box to show or hide them. On Windows, **Edit > Customize > Toolbars** lets you change and rearrange the tool icons that show on each toolbar. See "Personalizing Toolbars (Windows and Linux)," p. 354, for a complete discussion of customizing the toolbars on Windows.

Status Bar

The **Status Bar** command hides and shows the status bar at the bottom window edge.

On Macintosh

On the Macintosh, you find these commands in the **View** menu:

New Data View

The **New Data View** command displays a duplicate view of an open data table. The new view is linked to the original view and all corresponding reports. Changes made to a new view reflect on the original view immediately. On Windows, the **New Data View** command is located in the **Window** menu.

Redraw Window

The **Redraw Window** command redraws the active window. It is useful for cleaning up both data table views and graphs that have accumulated stray imperfections resulting from high-speed, dynamic handling of windows.

Make Text Bigger, Make Text Smaller

The **Make Text Bigger** and **Make Text Smaller** commands increase and decreases the size of text in JMP.

The Window Menu

The **Window** menu helps you organize the windows produced during a JMP session.

On Microsoft Windows and Linux

On Windows and Linux, you find these commands in the **Window** menu:

New Data View

The **New Data View** command displays a duplicate view of an open data table. The new view is linked to the original view and all corresponding reports. Changes made to a new view reflect on the original view when it is made active. On the Macintosh, the **New Data View** command is located in the **View** menu.

Close All Data Tables (Windows Only)

On Windows, the **Close All Data Tables** command closes all data tables when the active window is a data table. If the JMP Starter is the active window, this command is **Close Starter**. If a report is the active window, this command is **Close All Reports**. If a script is the active window, this command is **Close All Scripts**.

Close All

The **Close All** command closes all open windows.

Arrange (Windows Only)

On Windows, the **Arrange** command helps you organize the open windows within JMP. Choose from one of the submenu items:

Cascade Arranges open windows so that the title bar of each window is visible.

Tile Arranges open windows side by side so all of them are visible. **Tile Horizontally** stacks the windows and **Tile Vertically** arranges the windows side by side.

Arrange Icons Arranges minimized icons into row(s) at the bottom of the JMP window.

Cascade (Linux Only)

The **Cascade** command arranges open windows so that the title bar of each window is visible. On Windows, this command is found under **Window > Arrange > Cascade**.

Tile (Linux Only)

The **Tile** arranges open windows side by side so all of them are visible. On Windows, this command is found under **Window > Arrange > Tile**.

Redraw

The **Redraw** command redraws the active window. It is useful for cleaning up both data table views and graphs that have accumulated stray imperfections resulting from high-speed, dynamic handling of windows. On the Macintosh, the **Redraw** command is located in the **View** menu.

Font Sizes (Windows and Linux Only)

On Windows and Linux, the **Font Sizes** command gives you a quick way to change the font size JMP uses. Choose from one of the submenu items:

Increase Font Size Increases the font size. Select again to increase the font size again.

Decrease Font Size Decreases the font size. Select again to decrease the font size again.

Move to Back

The **Move To Back** command moves the active window behind all other windows generated by the current JMP session, leaving the next window in the sequence showing.

Set Title

The **Set Title** command lets you change the name of any active JMP window. This is useful if you generate multiple output reports and need to distinguish among them during the JMP session. For options on changing the title of data tables, see "Changing Table Names," p. 83. For options on changing the title of JMP output reports, see "Renaming a Report," p. 174.

Hide

The **Hide** command suppresses the display of the active window but does not close it. On Windows, hidden windows do not appear in the list of open JMP windows found on the bottom of the **Window** menu.

Unhide (Windows Only)

To reshow a hidden window, select its name from the list displayed by the **Unhide** command. Choosing **All** from the **Unhide** menu displays all JMP windows.

List All

The **List All** command enables you to select the window you want to be the active window. This command is useful if you have a large number of open windows, where the windows might be data tables, reports, journals, and layouts. On Microsoft Windows, hidden windows do not appear in the list.

The last section of the **Window** menu lists all available windows. On Windows, windows that are hidden are not displayed in this list. Bring any window to the front by clicking on it in this list.

On Macintosh

On the Macintosh, you find these commands in the **Window** menu:

Minimize

The **Minimize** command shrinks the window into an icon on the dock. To unroll or expand the window, select **Minimize** again.

Zoom

The **Zoom** command enlarges the window to use the available monitor screen. To reduce the window size, select **Zoom** again.

Bring All to Front

The **Bring All to Front** command moves all JMP windows to the front of the screen.

Set Report Title

The **Set Title** command lets you change the name of any active JMP window. This is useful if you generate multiple output reports and need to distinguish among them during the JMP session.

JMP Starter

The **JMP Starter** command opens and closes the JMP Starter. You can also close the JMP Starter with **File > Close** when it is the active window or by clicking its close box.

The last section of the **Window** menu lists all unhidden available windows. Bring any window to the front by clicking on it in this list.

Log

The **Log** command displays a window that monitors JSL statements (JSL scripts) as they execute. The log window is editable. For example, you can use the log to locate errors in the script, correct the code, copy it and paste it back into the script window, submit the corrected script.

The Help Menu

The Help menu provides links to information about JMP, from the online Help system to JMP tutorials.

Contents, Search, and Index (Windows and Linux) and JMP Help (Macintosh)

Access the JMP Help system. The Help system provides navigable online JMP documentation.

Tip of the Day

Displays the Tip of the Day window. See "The Tip of the Day Window," p. 9 in the "Creating and Opening Files" chapter for details.

Indexes

Displays the following sources for your reference:

Statistics Accesses references that give definitions of statistical terms. Once you are in the Statistics Index window, click the **Topic Help** button to go to the place in the online Help that describes the highlighted topic. Click **Launch** to run the script that corresponds to the item you have highlighted in the list. Click **Example** to view an example of the highlighted topic.

JSL Functions Presents a list of JSL functions, such as Sin, Cos, Sqrt, and Abbrev Date that you would use when writing JSL. Highlight an operator name to see a description of the operator appears in the window on the right. Click the **Topic Help** button to locate the topic in the online Help.

Object Scripting Presents a list of JSL objects. These are scriptable JSL building blocks. Highlight an object name and messages the object recognizes appear in the window on the right.

DisplayBox Scripting Presents a list of the elements that make up a JMP report. These elements are the JSL building blocks with which you build output. Highlight a Display Box and available messages for each object appear in the window on the right.

Tutorials

Contains a submenu that open JMP tutorials.

Books

Opens .pdf files of the JMP documentation.

Sample Data

Opens the directory where sample data files are stored.

JMP.com and JMP User Community

Open the default browser and takes you to the JMP Web site at www.jmp.com and to JMP user forums online.

About JMP

Displays a panel that shows the release, the copyright, the operating system, and the owner of the copy of JMP that is running.

Note: On Macintosh, **About JMP** is on the **JMP** menu.

The Layout Menu

If you want to copy a JMP window to a separate window and manipulate pieces of it, you would use the **Layout** command. See "Saving Using the Layout Command," p. 118, for details.

Group

The **Group** command combines selected objects into a single object or group.

Ungroup

The Layout window begins with all report elements grouped into a single object. When you click on the layout, the group is highlighted. The **Ungroup** command ungroups selected objects.

The first time you use **Ungroup**, the title of the analysis becomes an object, and is the outermost outline level of the analysis. The remaining nesting levels become an object. You can continue to select any portion of the layout window and use the **Ungroup** command repetitively to ungroup the analysis into its smallest elements.

Align

The **Align** command aligns selected objects according to the type of alignment you select from the **Align** submenu. You can select as many objects as you want for alignment. However, objects overlap if they are positioned on the layout window in such a way as to conflict with the alignment request.

Clean Up

Layout objects can be moved to any position in the Layout window, which means objects can overlap. When objects overlap, the front-most object hides some or all of the objects beneath it. The **Clean Up** command moves selected objects such that they are in separate positions in the layout window, and are all showing.

Move Forward, Move To Front, Move Backward, Move To Back

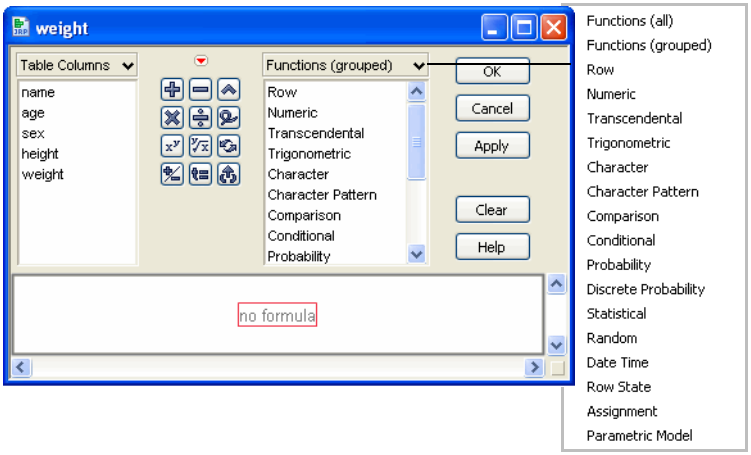
The **Move Forward** and **Move Backward** commands change the layer level of the selected objects forward or backward one layer at a time. **Move to Front** moves the selected objects to lay on top of all other objects. **Move to Back** moves the selected objects to lie beneath all other objects. Note that when objects are overlaid, the front most objects can hide objects beneath them.

Appendix C

Formula Functions Reference

A Description of Functions Available in JMP

You can add functions to a formula. All of these functions are organized in the function browser, which groups collections of functions and features in lists organized both alphabetically (**Functions (all)**) and by topic (**Functions (grouped)**), as shown below.



For instructions on how to create a formula that contains a function, see "Creating a Formula," p. 287.

This chapter gives a description of functions in the formula editor.

Contents

Row Functions 455
Numeric Functions 457
Transcendental Functions 457
Trigonometric Functions 459
Character Functions 460
Character Pattern Functions 465
Comparison Functions 467
Conditional Functions 468
Probability Functions 472
Discrete Probability Functions 480
Statistical Functions 481
Random Functions 485
Date Time Functions 488
Row State Functions 489
Assignment Functions 493
Parametric Model Functions 493

Row Functions

Adding a row function to a formula lets you reference specific rows or cells within specific rows. See the *JMP Scripting Guide* for details about syntax.

Sequence Sequence(from, to, step size=1, repeat each=1)

Produces an arithmetic sequence of numbers across the rows in a data table, where the start value, ending limit, and increment are specified as arguments.

Count Count(from, to, n steps, repeat each=1)

Creates a list of values beginning with the **from** value and ending with the **to** value. The number of **steps** specifies the number of values in the list between and including the **from** and **to** values. Each value determined by the first three arguments of the count function occurs consecutively the number of times you specify with the **times** argument. When the **to** value is reached, **Count** starts over at the **from** value.

Also, you can add the **times** argument with the insert button ( ) on the keyboard. This argument is one by default, but repeats the count process as many times as you specify, as illustrated by the Count4 column in the data table in Figure C.1. To add any argument to the **Count** function, highlight the argument preceding the one you want to enter and either type a comma or use the insert button ( ) on the formula editor keypad.

The columns in the data table below result from the following formulas:

- **Count (1, 9, 2)** gives Count 1
- **Count (1, 9, 3)** gives Count 2
- **Count (1, 9, 9)** gives Count 3
- **Count (1, 9, 3, 3)** gives Count 4

Figure C.1 Example of the Count Function

	count1	count2	count3	count4
1	1	1	1	1
2	9	5	2	1
3	1	9	3	1
4	9	1	4	5
5	1	5	5	5
6	9	9	6	5
7	1	1	7	9
8	9	5	8	9
9	1	9	9	9

The **Count** function is useful for generating a column of grid values. For example, the following formulas create a square grid of increment **NRow()** (the **Row** function that gives the total number of rows in the data table) and axes that range from –5 to 5:

```
Count (-5, 5, Root(NRow()))
Count (-5, 5, Root(NRow(), Root(NRow())))
```

Lag Lag(▭, 1)

Returns the value of the first argument in the row defined by the current row less the second argument. The default **Lag** is one, which you can change to any number. The value returned for any lag that identifies a row number less than one is missing. Note that `Lag(X, n)` gives the same result as the subscripted notation, $X_{Row()-n}$.

Dif Dif(▭, 1)

Returns the difference between the value of the first argument in the current row and its value in the row defined by the current row less the second argument. The default **Dif** is one, which you can change to any number. Note that `Dif(X, n)` gives the same result as $X_{Row()}-X_{Row()-n}$, or as $X_{Row()}-Lag(X, n)$.

Subscript ▭▭

Enables you to use a column's value from a row other than the current row. After choosing **Subscript** from the list, enter a numeric expression into the subscript argument. Subscripts that evaluate to nonexistent row numbers produce missing values. Column names with no subscript refers to the current row. To remove a subscript, select the subscript and delete it. Then delete the missing box.

The formula $Count_{Row()} - Count_{Row()-1}$, where **Row()** is the row number as described below, uses subscripts to calculate the difference between each pair of values from the column named Count. This result is the same as that given by the **Dif()** function. When **Row()** is 1, the computation produces a missing value.

The formula below calculates a column called Fib, which contains the terms of the *Fibonacci* series (each value is the sum of the two preceding values in the calculated column).

$$\text{If}\begin{bmatrix}\text{Row}()<=2 \Rightarrow 1\\ \text{else} \quad \Rightarrow Fib_{\text{Row}()-1}+Fib_{\text{Row}()-2}\end{bmatrix}$$

It shows the use of subscripts to do recursive calculations. A recursive formula includes the name of the calculated column, subscripted such that it references only previously evaluated rows (rows 1 through (i–1)). The calculation of the Fibonacci series shown includes a conditional expression and a comparison. See the sections "Using Conditional Clauses," p. 302, and "Comparing Values," p. 301, for details.

Row Row()

Returns the current row number when an expression is evaluated for that row. You can use **Row()** in any expression, including column name subscripts. The default subscript of a column name is **Row()** unless otherwise specified.

NRow NRow(▭)

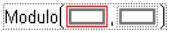
Returns the total number of rows in the active data table.

Numeric Functions

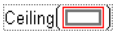
You can create a formula that contains arithmetic operators that are commonly used in formulas. See the *JMP Scripting Guide* for details about syntax.

Abs

Returns a positive number of the same magnitude as the value of its argument. For example, |5| and |–5| both result in 5.

Modulo 

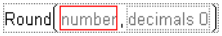
Returns the remainder when the second argument is divided into the first. For example, **Modulo(6, 5)** results in 1.

Ceiling 

Returns the smallest integer greater than or equal to its argument. For example, **Ceiling(2.3)** results in 3, while **Ceiling(–2.3)** results in –2.

Floor

Returns the largest integer less than or equal to its argument. For example, **Floor(2.7)** results in 2, but **Floor(–0.5)** results in –1.

Round 

Rounds the first argument to the number of decimal places given by the second argument. For example, **Round(3.554, 2)** rounds to 3.55 and **Round(3.555, 2)** rounds to 3.56.

Transcendental Functions

You can create a formula that supports transcendental functions, such as logarithmic functions for any base, functions for combinatorial calculations, the **Beta** function, and several gamma functions. See the *JMP Scripting Guide* for details about syntax.

Exp

Raises *e* to the power you specify. Thus, **Exp(1) = e**.

Log and Log10

Calculates the natural logarithm (base *e*). To change the default base, highlight the argument and type a comma or click the insert key on the keypad. The base appears and is editable. The **Log** argument can be any numeric expressions. The expression **Log(e)** evaluates as 1, and **Log2(32)** is 5. The **Log10** function calculates the logarithm of base 10 only.

Squish

Is an efficient computation of the function $1 / (1+e^{-x})$, where *x* is any numeric column, variable, or expression.

Root

Calculates the root of its argument as specified by the index. **Root** initially shows with an index of 2. To change the index, highlight the index argument and enter the value you want.

Factorial

Returns the product of all numbers 1 through the argument you specify. For example, **Factorial(5)** evaluates as 120.

NChooseK

Returns the number of *n* things taken *k* at a time (*n* select *k*) and is computed in the standard way using factorials, as *n*! / (*k*!(*n* – *k*)!). For example, **NChooseK(5,2)** evaluates as 10.

Beta

Adds the two parameter **Beta** function and is written terms of the Gamma function as:

$$B(m, n)) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$$

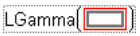
Gamma

Adds the **Gamma** function, denoted $\Gamma(i)$, and is defined as:

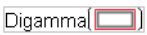
$$\Gamma(i) = \int_0^{\infty} (x^{i-1})(e^{-x})dx$$

In JMP, this formula computes gamma for each row using the current row number as *i*. The current row number is used in the formula for the gamma distribution and other probability distributions. (Gamma with a single argument is the same as **Gamma(x, infinity)**. The optional second argument changes the upper integer from infinity to the value you enter.) Other interesting gamma function relationships are

- for any $\alpha > 1$, $\Gamma(\alpha) = (\alpha–1) \bullet \Gamma(\alpha–1)$
- for any positive integer, *n*, $\Gamma(n) = (n\text{-}1)!$
- $\Gamma(0.5)$ = the square root of π

LGamma 

Is the natural log of the result of the gamma function evaluation. You get the same result using the **Log** (natural log) function with the **Gamma** function. However, the **LGamma** function computes more efficiently than do the **Log** (natural log) and the **Gamma** functions together. **NChooseK** is implemented using **LGamma** functions. The result is not always an exact integer. If the result is close to an integer, it is rounded up using the **Floor** function.

Digamma 

The logarithmic derivative of the **Gamma** function.

Trigamma Trigamma( )

The derivative of the **Digamma** function, or the logarithmic second derivative of the **Gamma** function.

Arrhenius Arrhenius( )

Calculates the non-specific component of the Arrhenius relationship that is then multiplied by the activation energy in the Arrhenius equation.

$$\frac{11605}{T + 273.15}$$

Arrhenius Inv ArrheniusInv( )

The inverse of the Arrhenius function:

$$\left(\frac{11605}{y}\right) - 273.15$$

Logit Logit( )

Applies the logit transformation to the argument using

$$\text{logit}(x) = \log\frac{x}{1-x}$$

Scheffe Cubic

Is used in fitting certain models. **Scheffe Cubic (X1, X2)** is equivalent to **X1*X2*(X1-X2)**.

Trigonometric Functions

You can create a formula that supports transcendental functions, such as logarithmic functions for any base, functions for combinatorial calculations, the **Beta** function, and several gamma functions. See the *JMP Scripting Guide* for details about syntax.

Sine, Cosine, Tangent Sine( ) Cosine( ) Tangent( )

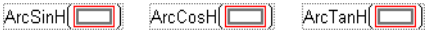
The **Sine** and **Cosine** functions calculate the sine and cosine of their respective arguments given in radians. For example, the expression **Sine(0)** evaluates as 0, and **Cosine(0)** evaluates as 1. The tangent function calculates the tangent of an argument given in radians. The expression **Tan(.25)** evaluates as 0.255342.

ArcSine, ArcCosine, ArcTangent ArcSine( ) ArcCosine( ) ArcTangent( )

The **ArcSine** and **ArcCosine** functions return the inverse sine and inverse cosine of their respective arguments. The returned value is measured in radians. For example, both expressions **ArcSine(1)** and **ArcCosine(0)** evaluate as 1.57080. The **ArcTangent** function returns the inverse tangent of its argument. The returned value is measured in radians. The expression **ArcTangent(0.5)** evaluates as 0.46364.

SinH, CosH, TanH

The **SinH** and **CosH** functions return the hyperbolic sine and hyperbolic cosine of their respective arguments. The expression **SinH(1)** evaluates as 1.175201, and **CosH(0)** evaluates as 1.0. The **TanH** function returns the hyperbolic tangent of its argument. The expression **TanH(1)** evaluates as 0.761594.

ArcSinH, ArcCosH, ArcTanH 

The **ArcSinH** and **ArcCosH** functions return the inverse hyperbolic sine and inverse hyperbolic cosine of their respective arguments. The expression **ArcSinH(1)** evaluates as 0.881374, and **ArcCosH(1)** is 0. The **ArcTanH** function returns the inverse hyperbolic tangent of its argument. The expression **ArcTanH(0.5)** evaluates as 0.549306.

Character Functions

You can create a formula that accepts character arguments or returns character strings and converts the data type of a value from numeric to character, or character to numeric. See the *JMP Scripting Guide* for details about syntax.

Char

Produces a character string that corresponds to the digits in its numeric argument. For example, **Char(1.123)** evaluates as 1.123. See the *JMP Scripting Guide*, for details.

Concat ||

Concatenates character strings to produce a new string with the function's second character argument appended to the first. For example, **"Dr." || " " || name** produces a new string consisting of the title **Dr.** followed by a space and the contents of the *name* string. (See also "Concat Items," p. 464.)

Contains

Returns the numeric position within the first argument of the first instance of the second argument, if it exists. The second argument can contain one ore more characters. If the second argument does not exist, **Contains** returns a zero. For example, **Contains("Veronica Layman", "ay")** evaluates as 11. **Contains("Lillie Layman", "L")** evaluates as 1. The third argument is optional and is a numeric value that specifies the starting position. If *offset* is negative, **Contains** searches backward from *offset* from the end of the string.

Munger

Computes new character strings from existing strings by inserting or deleting characters. It can also produce substrings, calculate indices, and perform other tasks depending on how you specify its arguments. The **Munger** function treats uppercase and lowercase letters as different characters.

Text is a character expression. **Munger** applies the other three arguments to this string to compute a result.

Offset is a numeric expression indicating the starting position to search in the string. If **Offset** is greater than the position of the first instance of the find argument, the first instance is disregarded.

Find/Length is a character or numeric expression. Use a character string as search criterion, or use a positive integer to return that number of consecutive characters starting from the **Offset** position. If you specify a negative integer as the **Length** value, **Munger** returns all characters from the **Offset** through to the end of the string.

Replace (optional argument) can be a string or unspecified. If it is a string and the **Find/Offset** value is numeric, **Munger** replaces the search criterion with the **Replace string** to form the result. If the Find/Offset value is numeric and no string is specified, **Munger** calculates a substring. If the **Find/Length** value is a character string, **Munger** always returns the numeric offset, disregarding the **Replace** value if it exists. To insert the **Replace** argument, click any argument in the **Munger** function and then click the insert button. Use the delete key on your keyboard or the delete button ( ) on the formula editor keypad to remove the **Replace** argument.

Lowercase, Uppercase Lowercase( ) Uppercase( )

The **Lowercase** function converts any uppercase character found in its argument to the equivalent lowercase character. For example, **Lowercase("VERONICA LAYMAN")** evaluates as veronica layman. The **Uppercase** function converts any lowercase character found in its argument to the equivalent uppercase character. For example, **Uppercase("Veronica Layman")** evaluates as VERONICA LAYMAN.

Length Length( )

Calculates the length of its argument. For example, **Length("Veronica")** evaluates as 8. If the argument is

- a string, length returns the number of characters;
- a list, length returns the number of items in the list;
- a blob (binary object), the number of bytes.

Num Num( )

Produces a numeric value that corresponds to its character string argument when the character string consists of numbers only. If a character string contains a non-numeric value, the result is a missing value. For example, **Num("1.123")** evaluates as 1.123.

Substr Substr(text , start , length)

Extracts the characters that are the portion of the first argument beginning at the position given by the second argument and ending based on the number of characters specified in the third argument. The first argument can be either a character column or a literal value. The starting argument and the length argument can be numbers of expressions that evaluate to numbers. For example, to show the first name only, **Substr("Veronica Layman", 10, 6)** starts at position 11 and reads through position 16, which yields **Layman**.

If *start* is negative, **Substr** searches backward from *start* from the end of the string. If *length* is negative or absent, **Substr** returns a string that begins with *start* and continues to the end of *s*.

Substr can also be used with lists.

Trim Trim( )

Produces a new character string from its argument, removing any trailing blanks. For example, **Trim("john ")** evaluates as john.

Word Word(n, text) Word(n, text, delimiters)

Extracts the n^{th} word from a character string. One or more spaces define where each word begins and ends unless the optional **delimiters** argument is specified. For example, **Word(2, "Veronica Layman")** returns the word **Layman**.

To insert the **delimiters** argument, click on any argument in the **Word** function and then click the insert button on the formula editor keypad. Use the delete key on your keyboard or the delete button on the formula editor keypad to remove the **delimiters** argument. If you do not specify a delimiter, space is used as the delimiter. If you define the delimiter as an empty string, each character is treated as a separate word.

Most special characters act as single delimiters. You can enter any character or set of characters to act as a word delimiter. For example, to extract the last name in the following example, use a comma and blank together as the delimiting characters and ask for the first word. **Word(1, "Layman, Veronica", ", ")** returns the word **Layman**.

Words Words(text) Words(text, delimiters)

Extracts the words from *text* according to the delimiters listed in the optional second argument. The default delimiter is space. For example, **Words("the quick brown fox")** returns {**"the","quick","brown","fox"**}.

If you include a second argument, any and all characters in that argument are taken to be delimiters. For example, **Words("Doe, Jane P.",", .")** returns {**"Doe","Jane","P"**}.

To insert the **delimiters** argument, click on any argument in the **Words** function and then click the insert button on the formula editor keypad. Use the delete key on your keyboard or the delete button on the formula editor keypad to remove the **delimiters** argument. If you do not specify a delimiter, whitespace is used as the delimiter. If you define the delimiter as an empty string, each character is treated as a separate word.

Left, Right Left(text, n) Right(text, n)

Returns a substring of the left-most or right-most *n* characters of the string *text*, respectively. Both functions also work with lists.

Starts With, Ends With Starts With(whole, part) Ends With(whole, part)

Returns 1 if *whole* begins or ends with *part*, respectively. Returns 0 otherwise. Both functions also work with lists.

Item Item(n, text) Item(n, text, delimiters)

Is different than the **Word** function because of the way it treats word delimiters. If a delimiter is found multiple times, or you enter a delimiter with multiple characters, the **Word** function treats them as a single delimiter. The **Item** function uses each delimiter to define a new word position. To compare, suppose a name is of the form lastname, firstname. The delimiter is a comma followed by a blank, such as:

Item(2, "Layman, Veronica", ", ")

Word(2, "Layman, Veronica", ", ")

The **Item** function returns a missing value because it treats the comma and blank separately and finds nothing between them. The **Word** function treats the comma and blank as a single delimiter and finds **Veronica** as the second word.

If you do not specify a delimiter, white space (blank space) is used as the delimiter. If you define the delimiter as an empty string, each character is treated as a separate item.

Char to Hex, Hex, Hex to Char, Hex to Number

Converts between Hex and other formats.

Hex returns the hex representation of its argument. If the argument is character (in quotes), then the result is a character string twice as long containing the hexadecimal codes for the character values. For example, **Hex("A")** returns the string 41.

If the argument is numeric and "integer" is specified, the Hex function returns an 8-hex-character representation of the integer returned. For example, **Hex(12, "integer")** returns the string **0000000C** (Macintosh) or **0C000000** (Windows and Linux).

Hex to Char converts hexadecimals to characters. The resulting character string might not be valid display characters. All the characters must be in pairs, in the ranges 0-9,A-Z, and a-z. Blanks and commas are allowed and skipped.

Char to Hex converts characters to hexadecimals.

Hex to Number converts hexadecimals to numbers.

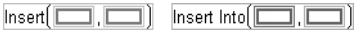
For details, see "Internal functions (calculator functions)" in the "Syntax Reference" chapter of the *JMP Scripting Guide*.

Repeat

Creates a string that is the first argument repeated the number of times specified by the second argument. The first argument can be either a character literal, a character variable, or a character expression. For example, **Repeat("Katie", 3)** creates **KatieKatieKatie**.

A third argument applies when **Repeat** is used in a JSL script to repeat a matrix. When the first argument is a matrix, the second argument is the rowwise repeat and the third argument is the columnwise repeat.

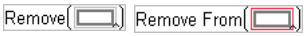
Insert, Insert Into



Insert inserts a new item into the *list* or *expression* at the given position. If position is not given, it is inserted at the end.

Insert Into is the same as insert, but it inserts in place.

Remove, Remove From



Remove the character(s) at the indicated *position*. If *n* is omitted, the item at *position* is deleted. If position and n are omitted, the item at the end is removed. There are three possible arguments: the string, followed by the position, followed by the number of characters to be removed.

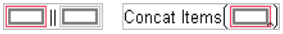
Remove From returns items removed in place. The function returns the removed item(s), but you don't have to assign them to anything. The first argument is a variable name, followed by the position, followed by the number of characters to be removed.

Shift, Shift Into

Shift shifts an item or *n* items from the front to the back of the *list* or *expression*. Shifts items from back to front if *n* is negative. **Shift Into** shifts items in place.

Reverse, Reverse Into

Reverse reverses the characters in the string. **Reverse Into** reverses the characters in place.

Concat Items 

Concat Items converts a list of string expressions into one string, with each item separated by a delimiter. The delimiter is a blank, if unspecified.

Substitute, Substitute Into

The first argument is a string, the second is a pattern, and the third is a replacement string. **Substitute** finds all matches to the pattern in the string, and replaces them with the replacement string. **Substitute Into** does the same substitution in place.

Regex

The first argument is the source string that Regex searches for a match to the pattern. The second argument is the pattern, in the form of a regular expression. The Formula Editor prompts you for these two required arguments.

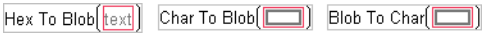
Tip: For more information about using regular expressions, search the Internet for *regular expression tutorial*.

By default, Regex performs a case-sensitive search and returns the parts of the source string that match the pattern you specified (or returns MISSING if the match fails). There are two optional arguments that you can add. You can type a third argument—the *format*—that specifies the string to return. If you choose, you can use regular expressions to specify replacement text in the returned string. If you specify the third argument, you can also specify **IGNORECASE** so that Regex ignores capitalization when searching the source string for a match.

Table C.1 Regex Examples

Sample Regex function	String that is returned
`Regex( "@ q3 #", "([a-z])([0-9])" )`	q3 The function is case sensitive, so q3 matches but Q3 would not.
`Regex( "@ Q3 #", "([a-z])([0-9])", "\0",IGNORECASE)`	Q3 Although \0 is the default argument, it is required in this example so that IGNORECASE can be specified.
`Regex( "@ Q3 #", "([a-z])([0-9])", "\2\1",IGNORECASE)`	3Q

For more information and an example you can run, select **Help > Indexes > JSL Operators** and select **Regex**.

Hex to Blob, Char to Blob, Blob to Char 

Hex to Blob converts the hexadecimal to a blob (Binary Large Object).

Char to Blob converts the string to a blob. You can specify the encoding in an optional second argument. Supported encodings are: utf-8, utf-16le, utf-16be, us-ascii, iso-8859-1, and ascii-hex.

Blob to Char converts the blob to a string. You can specify the encoding in an optional second argument. Supported encodings are: utf-8, utf-16le, utf-16be, us-ascii, iso-8859-1, and ascii-hex.

Character Pattern Functions

These functions provide powerful pattern matching abilities. For complete details, see the *JMP Scripting Guide*.

Pat Any

Constructs a pattern that matches a single character in the argument.

Pat Not Any

Constructs a pattern that matches a single character that is not in the argument.

Pat Break

Constructs a pattern that matches zero or more characters that are not in its argument; it stops or breaks on a character in its argument. It fails if a character in its argument is not found (in particular, it fails to match if it finds the end of the source string without finding a break character).

Pat Span

Constructs a pattern that matches one or more (not zero) occurrences of characters in its argument. It is greedy; it always matches the longest possible string. It fails rather than matching zero characters.

Pat String

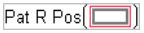
Constructs a pattern that matches its string argument.

Pat Len

Constructs a pattern that matches n characters.

Pat Pos

Constructs patterns that match the null string if the current position is *int* from the left end of the string, and fail otherwise.

Pat R Pos 

Constructs patterns that match the null string if the current position is *int* from the right end of the string, and fails otherwise.

Pat Tab Pat Tab()

Constructs a pattern that matches forward to position *int* in the source string. It can match 0 or more characters. It fails if it would have to move backwards or beyond the end of the string.

Pat R Tab Pat R Tab( )

Constructs a pattern that matches up to position n from the end of the string. It can match 0 or more characters. It fails if it would have to move backwards or beyond the end of the string.

Pat Test Pat Test( )

Constructs a pattern that succeeds and matches the null string if *expr* is not zero and fails otherwise.

Pat At Pat At( )

Constructs a pattern that matches the null string and stores the current position in the source string into the specified JSL variable (*varName*). The assignment is immediate, and the variable can be used with `expr()` to affect the remainder of the match.

Pat Rem Pat Rem()

Constructs a pattern that matches the remainder of the string. It is equivalent to patRTab(0).

Pat Arb Pat Arb()

Constructs a pattern that matches an arbitrary string. Initially it will match the null string. It will match one additional character each time the pattern matcher backs into it.

Pat Succeed Pat Succeed()

Constructs a pattern that always succeeds, even when the matcher backs into it. It matches the null string.

Pat Fail Pat Fail()

Constructs a pattern that fails whenever the matcher attempts to move forward through it. The matcher backs up and tries different alternatives. If and when there are no alternatives left, the match will fail and `Pat Match` will return 0.

Pat Abort Pat Abort()

Constructs a pattern that immediately cancels the pattern match. The matcher does not back up and retry any alternatives. Conditional assignments are not made. Immediate assignments that were already made are kept.

Pat Fence Pat Fence()

Constructs a pattern that succeeds and matches the null string when the matcher moves forward through it, but fails when the matcher tries to back up through it. It is a one-way trap door that can be used to optimize some matches.

Pat Arb No Pat Arb No( )

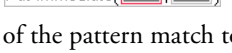
Constructs a pattern that matches zero or more copies of pattern.

Pat Repeat Pat Repeat( )

Matches pattern between minimum and maximum times.

Pat Conditional

Saves the result of the pattern match, if it succeeds, to a variable named as the second argument (type) after the match is finished.

Pat Immediate 

Saves the result of the pattern match to a variable named as the second argument (*varName*) immediately.

Pat Altern

Constructs a pattern that matches any one of the pattern arguments.

Pat Concat

Constructs a pattern that matches each pattern argument in turn.

Pat Regex

Constructs a pattern that matches the regular expression in the quoted string argument.

Pat Match

Pat Match executes a pattern match using the source in the first argument and the pattern in the second argument. The pattern must be constructed first, either inline or by assigning it to a JSL variable elsewhere. A third argument, if present, is the replacement text for the matched characters in the source argument (if the source argument is a variable). Pat Match returns true if the match succeeds. Additional arguments, in any order, are ANCHOR (match must begin at start of source), FULLSCAN (turn off some optimizations for special situations), and MATCHCASE (by default, A == a).

Pat Match returns true or false rather than a string, so Pat Match is somewhat difficult to use in a formula. You might find the Regex function (p. 464) easier to use when you are adding pattern-matching formulas in the Formula Editor.

Regex Match

Regex Match is similar to Pat Match. Regex Match executes a pattern match using the source in the first argument and the pattern in the second argument. Regex Match uses a regular expression for the second argument and returns a list of information about the result of the match.

A simpler function, Regex (p. 464), is also available. Regex returns a string value rather than a list, so Regex is usually easier to use in the Formula Editor than RegEx Match.

Comparison Functions

You can create a formula that compare the values of two arguments by using the comparison function. Each comparison relationship evaluates as *true* or *false* based on numeric magnitudes or character rankings. A true relationship evaluates as one, and false evaluates as zero.

Comparisons are useful when you include them in conditional expressions, but they can also stand alone as numeric expressions if neither term in comparison is missing. See the *JMP Scripting Guide* for details about syntax.

< Less than

> Greater than

<= Less than or equal to

>= Greater than or equal to

== Equal to

!= Not equal to

a<b<=c *b* is greater than *a* and less than or equal to *c*

a<=b<c *b* is greater than or equal to *a* and less than *c*

Is Missing Is Missing( ) Returns a one (1) if the value of the argument for the current row is missing, and a zero if the value is not missing. The formula editor excludes missing numeric values from its statistical calculations.

Conditional Functions

You can include conditional expressions (called *conditionals* for short) in your formulas. These expressions let you build a sequence of clauses paired with result expressions. Constructing a sequence of clauses is the way you conditionally assign values to cells in a calculated column. See the *JMP Scripting Guide* for details about syntax.

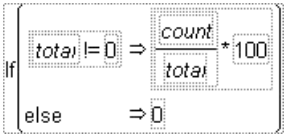
Use the insert and delete clause buttons on the formula editor panel to expand the expression. For maximum efficiency, list the most frequently evaluated clause/result pairs first in the sequence.

Note: Interpolate, **Step**, **For**, and **While** are most often used in conjunction with other commands to build a JSL script. You can use the formula editor to create and execute a script in that column, but this is not recommended because of dependencies and ambiguities that can result. Most often, scripts are stored as .JSL files, and can be saved with a data table as a table property. See "The Table Panel," p. 50, for details about table properties, and see the *JMP Scripting Guide* for documentation of all scripting commands.

If

Shows a single **If** condition with a missing expression and a missing **then clause**. Highlight either **expr** or **then clause** and enter a value. For example, to calculate count as a percentage of total when total is not 0, enter the conditional expression (using columns called **count** and **total**) in Figure C.2.

Figure C.2 A Conditional Expression



To add a new condition to the **If** conditional, highlight **then clause** and click the insert button ( ) on the formula editor keypad. Initially, this changes the existing **else** condition to an **expr** clause. Click

the insert button again to add an **else clause**. Highlighting **then** or **else** and repetitively clicking the insert button changes the **else** to **expr** or adds a new **expr** clause.

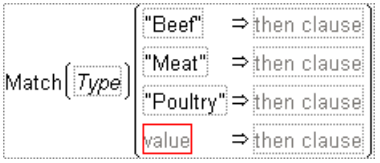
To delete a clause, select the **then clause** above it and press the delete key on your keyboard or click the delete button ( ) on the formula editor keypad.

By definition, expressions that evaluate as zero are false. If an expression evaluates as missing, no clauses are executed and missing is returned. All other numeric expressions are true.

Match

Compares an expression to a list of clauses and returns the value of the resulting expression for the first matching clause encountered. You provide the matching expression only once and then give a match value for each clause. When you select **Match**, the formula editor shows a single **Match** condition with a missing expression and a missing **then clause**, as shown in Figure C.3.

Figure C.3 An Example of Using the Match Function



After you select **Match**, you should highlight either **expr**, **value**, or **then clause**, and then enter an expression. (Or, if you highlight an expression and click **Match**, the formula editor creates a new **Match** conditional with the original highlighted expression as **expr** and nothing for the **value** and **else clause**.) Also, keep in mind that:

- **Match** evaluates faster and uses less memory than an equivalent **If** because the variable is evaluated only once for each row in the data table. The **If** condition must evaluate the variable at each **If** clause for each row until a clause evaluates as true. See "Comparing Values," p. 301, for a comparison of **Match** and **If** conditionals.
- With **If** and **Match**, the formula editor searches down from the top of the sequence for the first true clause and evaluates the corresponding result expression. Subsequent true clauses are ignored.

For example, consider the following two formulas for predicting a child's height from his age. In each case there is a base height of 58.125 inches to which a quantity is added depending on the value of the **age** variable.

$$58.125+\text{Match}(age)\begin{cases}12 \Rightarrow 0\\ 13 \Rightarrow 2.16071428571425\\ 14 \Rightarrow 6.04166666666666\\ 15 \Rightarrow 6.44642857142854\\ 16 \Rightarrow 6.20833333333332\\ 17 \Rightarrow 8.54166666666665\\ \text{else} \Rightarrow .\end{cases}$$

$$58.125+\text{If}\begin{cases}age==12 \Rightarrow 0\\ age==13 \Rightarrow 2.16071428571425\\ age==14 \Rightarrow 6.04166666666666\\ age==15 \Rightarrow 6.44642857142854\\ age==16 \Rightarrow 6.20833333333333\\ age==17 \Rightarrow 8.54166666666665\\ \text{else} \Rightarrow \text{else clause}\end{cases}$$

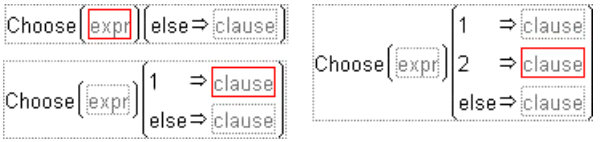
Note: Match ignores trailing spaces, while **If** does not.

Although `Match` returns missing for any missing values, you can also specifically match missing values.

Choose

Choose is a special case of **Match** in which the arguments of the condition are a sequence of integers starting at one. The value of **clause** replaces the match condition. An example of a **Choose** condition is shown in Figure C.4. With **Choose**, the formula editor goes directly to the correct choice clause and evaluates the result expression.

Figure C.4 Example of a **Choose** Condition



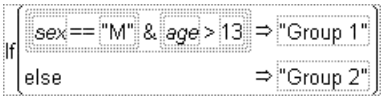
When you highlight an expression and click **Choose**, the formula editor creates a new conditional expression with one **clause**. Use the insert ( ) and delete ( ) buttons on the keypad to add new clauses or remove unwanted clauses, as described previously for the **If** conditional.

Choose evaluates the **choose** expression and goes immediately to the corresponding result expression to generate the returned value. With **Choose**, you provide a choosing expression that yields sequential integers starting at 1 only once, and then you give a choice for each integer in the sequence.

And &

Evaluates as 1 when both of its arguments are true. Otherwise it evaluates as 0. (See Figure C.7.) The formula in Figure C.5 labels Group 1 as drivers only if both comparisons are true.

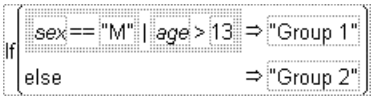
Figure C.5 Creating an **And** Function



Or |

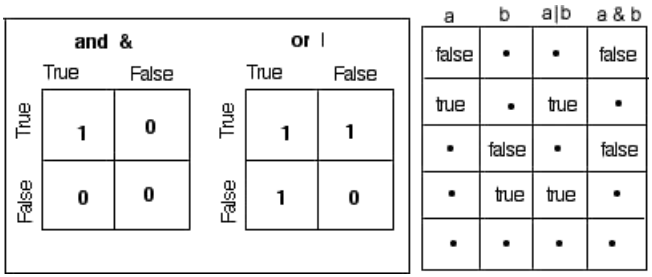
Evaluates as 1 when either of its arguments is true. If both of its arguments are false, then the **Or** expression evaluates as 0. (See Figure C.7.) The formula in Figure C.6 assigns males and all participants over 13 to Group 1.

Figure C.6 Creating an **Or** Function



The truth tables on the left in Figure C.7 illustrate the results of the **And** (**&**) and **Or** (**|**) functions when both arguments have nonmissing values that evaluate to true or false. The table on the right illustrates the result when either the left or right expression (call them **a** and **b**) or both have missing values.

Figure C.7 Evaluations of And and Or Expressions



a	b	a|b	a & b
false	•	•	false
true	•	true	•
•	false	•	false
•	true	true	•
•	•	•	•

Not !

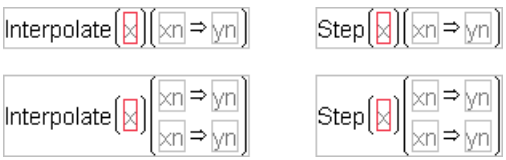
Evaluates as 1 when its argument is false. Otherwise, **Not** evaluates as **0**. When you apply the **Not** function, use parentheses where necessary to avoid ambiguity. For example, `!(weight==64)` can be either true or false (either 1 or 0), but `(!weight)==64` is always false (0) because `Not` can return only 0 or 1. Expressions such as `!(weight==64)` can also be entered as `weight != 64`.

Interpolate

Linearly interpolates the *y*-value between two points, *x1*, *y1* and *x2*, *y2* that corresponds to the arguments you give. You can insert additional pairs of *x*, *y* arguments with the insert key. **Interpolate** finds the pair of *x*, *y* points that correspond to the *x*-value and completes the interpolation.

Step

Is like **Interpolate** except that it returns the *y*-value corresponding to the greatest *x*-value less than or equal to the *x* and *y* arguments. That is, it finds the corresponding *y* for a given *x* from a step function rather than a linear fit between points. Like **Interpolate**, you can have as many *x* and *y* argument pairs as you want.



For For(init, while, next, body)

Repeats the statements in the **body** argument as long as the **while** condition is true. The **init** and **next** control the iterations.

While While(expr, body)

Repeatedly tests the **expr** condition and executes the **body** until **expr** is no longer true.

Break, Continue

Break stops execution of a loop completely and continues to the statement following the loop. **Continue** ends the current iteration of a loop and begins the loop at the next iteration.

Both are used in **For**, **While**, and **For Each Row** loops.

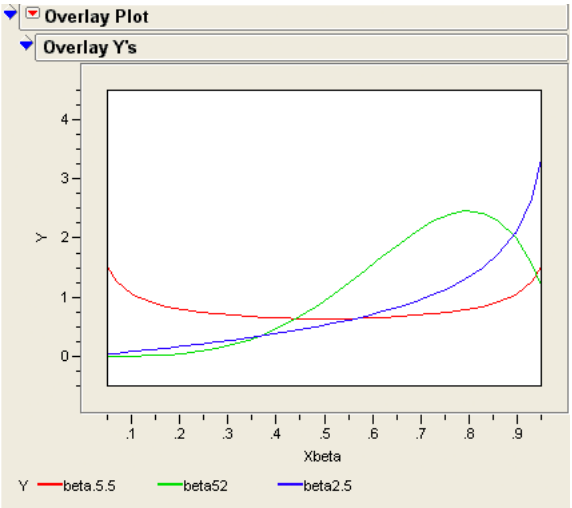
Probability Functions

You can create a formula that calculates probabilities and quantiles for statistical distributions like beta, Chi-square, F, gamma, normal, Student's t, Weibull distributions, Tukey HSD, and so on. See the *JMP Scripting Guide* for details about syntax.

Beta Density

Requires three arguments: quantile argument, shape parameters alpha and beta. A threshold parameter (theta) and a scale parameter (sigma > 0) are additional options. It returns the value of the beta probability density function (pdf) for the given arguments. The beta density is useful for modeling the probabilistic behavior of random variables such as proportions constrained to fall in the interval [0, 1]. Examples of densities for several combinations of α and β are shown in Figure C.8.

Figure C.8 Overlay Plot of Three Beta Density Curves



Beta Distribution

Has a positive density only for an x interval of finite length, unlike normal and gamma which have positive density over an infinite interval. The theoretical beta distribution has a shape parameter, $\alpha > 0$ and a scale parameter, $\beta > 0$, and constants $a \leq x \leq b$ that define the interval for which the distribution has values. The beta distribution function accepts the response variable argument x, whose range defines the interval for the distribution. The standard beta distribution occurs in the interval [0, 1]. The beta distribution function is the inverse of the beta quantile function.

Beta Quantile

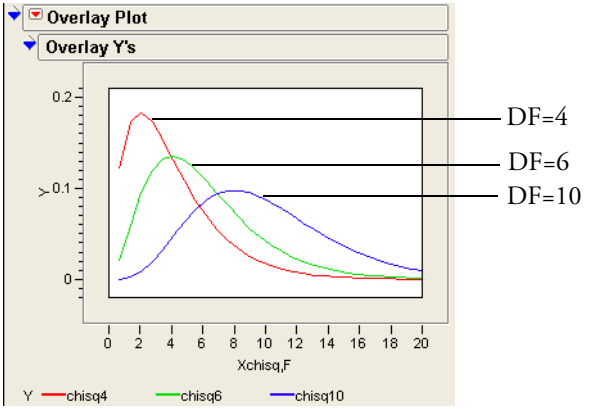
Accepts a probability argument, p, and shape and scale parameters, $\alpha > 0$ and $\beta > 0$. It returns the p^{th} quantile from the standard beta distribution. The beta quantile function is the inverse of the beta distribution function.

ChiSquare Density

Accepts a quantile argument from the range of values for the Chi-squared distribution, a degrees of freedom argument, and an optional noncentrality parameter. It returns the value of the Chi-squared

density function (pdf) for the arguments. Figure C.9 shows the shape of three Chi-squared curves, with degrees of freedom (DF) 4, 6, and 10.

Figure C.9 Overlay Plot of Three Chi-squared Density Curves



ChiSquare Distribution

Accepts a response argument (range of *x* values) and three parameter arguments: a quantile, a degrees of freedom, and a noncentrality parameter. It returns the probability that an observation from the Chi-squared distribution with the specified noncentrality parameter and degrees of freedom is less than or equal to the given quantile. For example, the expression **ChiSquare Distribution(11.264, 5)** returns the probability that an observation from the Chi-squared distribution centered at 0 with 5 degrees of freedom is less than or equal to 11.264. The expression evaluates as 0.95361.

Furthermore, the **ChiSquare Distribution** function accepts integer and noninteger degrees of freedom. It is centered at 0 by default. The **ChiSquare Distribution** function is the inverse of the **ChiSquare Quantile** function.

ChiSquare Quantile

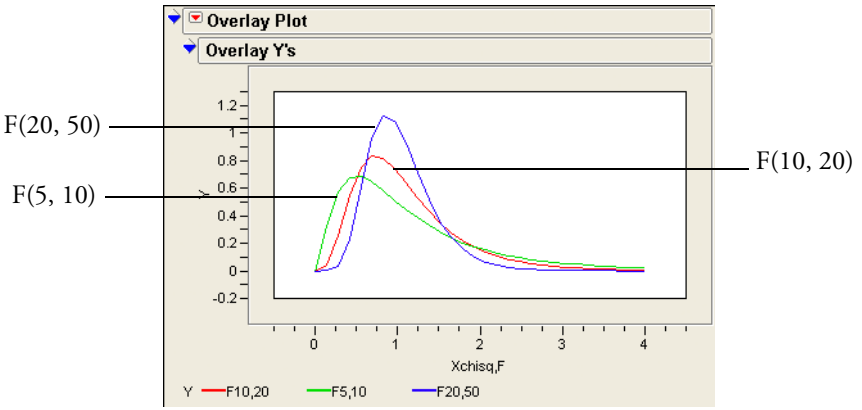
Accepts three arguments: a probability *p*, a degrees of freedom, and a noncentrality parameter. It returns the p^{th} quantile from the Chi-squared distribution with the specified noncentrality parameter and degrees of freedom. For example, the expression **ChiSquare Quantile(.95, 3.5, 4.5)** returns the 95% quantile from the Chi-squared distribution centered at 4.5 with 3.5 degrees of freedom. The expression evaluates as 17.50458.

The **ChiSquare Quantile** function accepts integer and noninteger degrees of freedom. It is centered at 0 by default. The **ChiSquare Quantile** function is the inverse of the **ChiSquare Distribution** function.

F Density

Accepts a quantile argument from the range of values for the *F*-distribution, numerator and denominator degrees of freedom arguments, and an optional noncentrality parameter. It returns the value of the *F*-density function (pdf) for the arguments. Figure C.10 shows the shape of three *F*-density curves, with degrees of freedom (5, 10), (10, 20), and (20, 50).

Figure C.10 Overlay Plot of Three *F*-Density Curves



F Distribution

Accepts four arguments: a quantile, a numerator and denominator degrees of freedom, and a noncentrality parameter. It returns the probability that an observation from the *F*-distribution with the specified noncentrality parameter and degrees of freedom is less than or equal to the given quantile. For example, the expression **F Distribution(3.32, 2, 3)** returns the probability that an observation from the central *F*-distribution with 2 degrees of freedom in the numerator and 3 degrees of freedom in the denominator is less than or equal to 3.32. The expression evaluates as 0.82639.

The *F*-distribution function accepts integer and noninteger degrees of freedom. By default, the non-central parameter is set to 0. The *F*-distribution function is the inverse of the **F Quantile** function.

F Quantile

Accepts four arguments: a probability *p*, a numerator and denominator degrees of freedom, and a noncentrality parameter. It returns the p^{th} quantile from the *F*-distribution with the specified noncentrality parameter and degrees of freedom. For example, the expression **F Quantile(0.95, 2, 10, 0)** returns the 95% quantile from the *F*-distribution centered at 0 with 2 degrees of freedom in the numerator and 10 degrees of freedom in the denominator. The expression evaluates as 4.1028.

The **F Quantile** function accepts integer and noninteger degrees of freedom. By default, the non-central parameter is set to 0. The **F Quantile** function is the inverse of the **F Distribution** function.

Gamma Density

Requires a quantile argument. Also accepts an optional shape parameter, which must be greater than zero and defaults to 1. A scale parameter *b*, which must be greater than zero and defaults to 1 is optional. And a threshold parameter, which must be in the range $-\infty < \theta < +\infty$ and defaults to zero is optional. Figure C.11 shows the shape of gamma probability density functions for **shape** parameters of 1, 3, and 5. The standard gamma density function is strictly decreasing when α (**shape**) ≤ 1. When $\alpha > 1$ the density function begins at zero when *x* is θ, increases to a maximum, and then decreases.

Gamma Distribution

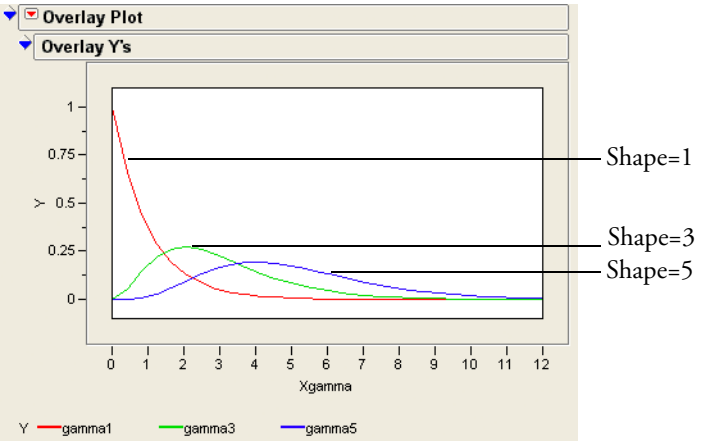
Is based on the standard gamma function, and accepts a single argument with a quantile value. The shape, scale, and threshold parameters are optional, with defaults as described previously in the discussion of the **Gamma Density** function. It returns the probability that an observation from a

standard gamma distribution is less than or equal to the specified *x*. The **Gamma Distribution** function is the inverse of **Gamma Quantile** function.

Gamma Quantile

Accepts a probability argument *p*, and returns the p^{th} quantile from the standard gamma distribution with the shape parameter you specify. The **Gamma Quantile** function is the inverse of the **Gamma Distribution** function.

Figure C.11 Overlay Plot of Gamma Density with Shape Parameter 1, 3, and 5



Normal Density

Accepts a quantile argument from the range of values for the standard normal distribution. It returns the value of the standard normal probability density function (pdf) for the argument. For example, you can create a column of quantile values (*x*) with the formula **count(-3, 3, nrow())** and a second column computed as **Normal Density(X)** to generate density values. Then select **Graph > Overlay** to plot the normal density by *x*. Figure C.12 shows an overlay plot of normal density curves with various means and standard deviations.

Normal Distribution

Accepts a quantile argument from the range of values for the standard normal distribution with mean 0 and standard deviation 1. It returns the probability that an observation from the standard normal distribution is less than or equal to the specified quantile. For example, the expression **Normal Distribution(1.96)** returns 0.975, the probability that an observation from the standard normal distribution is less than or equal to the 1.96^{th} quantile. Also, you can specify mean and standard deviation parameters to obtain probabilities from nonstandard normal distributions. The **Normal Distribution** function is the inverse of the **Normal Quantile** function.

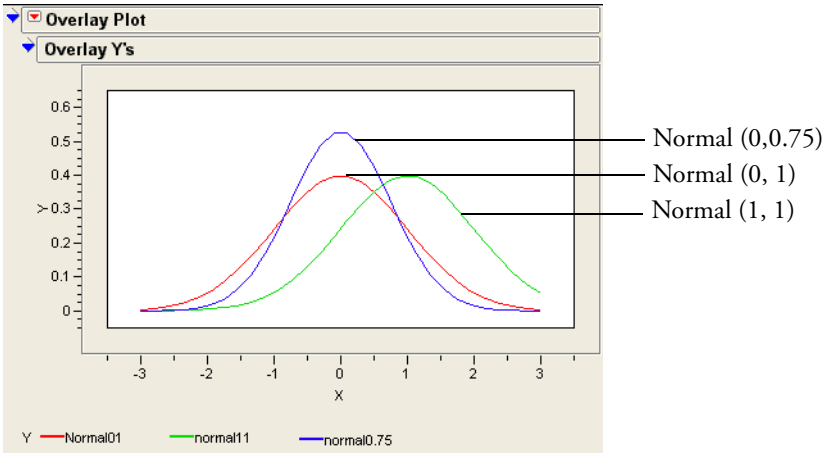
Normal Quantile (Probit)

Accepts a probability argument *p*, and returns the p^{th} quantile from the standard normal distribution. For example, the expression **Normal Quantile(0.975)** returns the 97.5% quantile from the standard normal distribution, which evaluates as 1.96. Also, you can specify parameter values for the mean and standard deviation to obtain quantiles from nonstandard normal distributions. The **Normal Quantile** function is the inverse of the **Normal Distribution** function.

Normal Biv Distribution

Computes the probability that an observation is less than or equal to (*x*,*y*) with correlation coefficient *r* where the observation is marginally normally distributed. You can specify the mean and standard deviation for the X and Y coordinates of the observation. The default values are 0 for both means and 1 for both standard deviations.

Figure C.12 Overlay Plots of Normal Density Curves



GLog Density

Returns the density or pdf at a particular quantile *q* of a generalized logarithm distribution with location *mu*, scale *sigma*, and shape *lambda*. When the shape parameter is equal to zero, the distribution reduces to a Lognormal(*mu*, *sigma*).

GLog Distribution

Returns the probability or cdf that a generalized logarithm distributed random variable is less than *q*. When the shape parameter is equal to zero, the distribution reduces to a Lognormal(*mu*, *sigma*).

GLog Quantile

Returns the quantile, the value for which the probability is *p* that a random value would be lower. When the shape parameter is equal to zero, the distribution reduces to a Lognormal(*mu*, *sigma*).

t Density

Accepts a quantile argument from the range of values for the *t*-distribution, a degrees of freedom argument, and an optional noncentrality parameter. It returns the value of the *t*-density function (pdf) for the arguments. To compare a *t*-density with 5 df with a standard normal distribution, you can create a column of quantile values (*x*) with the formula **count(-3, 3, nrow())**, a second column computed as **t Density(X)**, and a third column computed as **Normal Density(X)**. Then select **Graph > Overlay** to plot the *t*-density and the normal density by *x* to see the plot shown in Figure C.13. You can see that the *t*-density has slightly more spread than the normal.

t Distribution

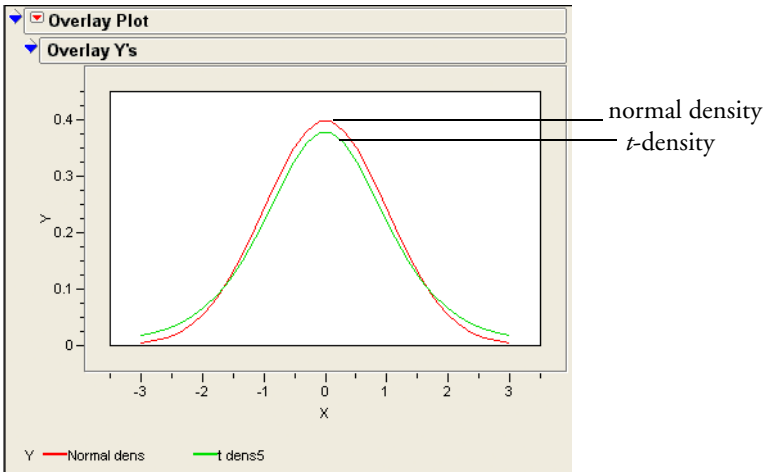
Accepts three arguments: a quantile, a degrees of freedom, and a noncentrality parameter. It returns the probability that an observation from the Student's *t*-distribution with the specified noncentrality

parameter and degrees of freedom is less than or equal to the given quantile. For example, the expression **t Distribution(.9, 5)** returns the probability that an observation from the Student's *t*-distribution centered at 0 with 5 degrees of freedom is less than or equal to 0.9. The expression is evaluated as 0.79531. *t*-distribution accepts integer and noninteger degrees of freedom. It is centered at 0 by default, but you can enter a value for the noncentrality parameter. The **t Quantile** function is the inverse of the **t Distribution** function.

t Quantile

Accepts three arguments: a probability *p*, a degrees of freedom, and a noncentrality parameter. It returns the p^{th} quantile from the Student's *t*-distribution with the specified noncentrality parameter and degrees of freedom. For example, the expression **Student's t Quantile(.95, 2.5)** returns the 95% quantile from the Student's *t*-distribution centered at 0 with 2.5 degrees of freedom. The expression evaluates as 2.558219. The **t Quantile** function is the inverse of the **t Distribution** function. This function also accepts integer and noninteger degrees of freedom. It is centered at 0 by default, but you have the option to enter a value for the noncentrality parameter. The **t Distribution** function is the inverse of the **t Quantile** function.

Figure C.13 Comparison of Normal Density and *t*-density



Weibull Density

Accepts a quantile argument from a range of values for the Weibull distribution. It returns the value of the Weibull probability density function (pdf), which is the probability that an observation from a Weibull distribution is less than or equal to the specified quantile argument.

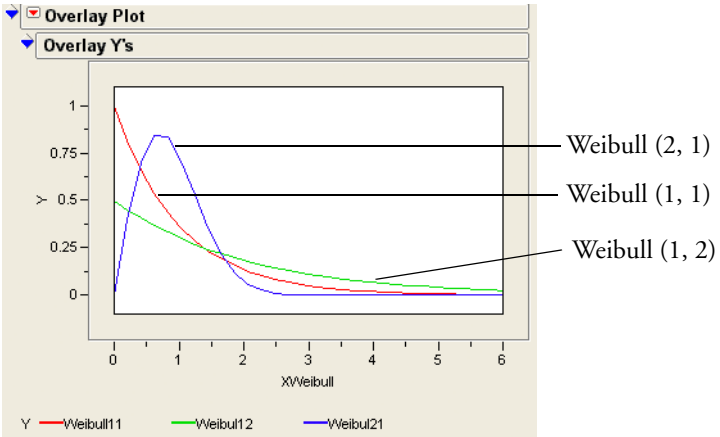
Weibull Distribution

Uses an argument with a quantile valud, an optional value for the scale parameter α and an optional shape parameter β. It returns the probability that an observation is less than or equal to the specified *x* for Weibull distribution with the shape and scale parameters you specified. The **Weibull Distribution** function is the inverse of **Weibull Quantile** function.

The Weibull distribution has different shapes depending on the values of α (a scale parameter that affects the *x* direction) and β (a shape parameter). It often provides a good model for estimating the length of life, especially for mechanical devices and in biology. The two-parameter Weibull is the same

as the three-parameter Weibull with a threshold of zero. Figure C.14 shows examples of several combinations of shape and scale parameter values, with the threshold parameter equal to zero.

Figure C.14 Comparison of Weibull Curves



The Weibull distribution has two parameters, $\alpha > 0$ and $\beta > 0$. When $\alpha = 1$ the pdf reduces to the exponential distribution (with $\gamma = 1 / \beta$). The exponential distribution is a special case of both the gamma and Weibull distributions. However, there are Weibull distributions that are not exponential distributions.

Weibull Quantile

Accepts a probability argument *p*, and returns the p^{th} quantile from the Weibull distribution with the shape and scale parameters you specify. The **Weibull Quantile** function is the inverse of the **Weibull Distribution** function.

Johnson Su Distribution

Returns the probability that a Johnson Su-distributed random variable is less than *x*.

Johnson Su Quantile

Returns the quantile whose value for which the probability is *p* that a random value would be lower.

Johnson Su Density

Returns the density at *x* of a Johnson Su distribution.

Johnson Sb Distribution

Returns the probability that a Johnson Sb-distributed random variable is less than *x*.

Johnson Sb Quantile

Returns the quantile whose value for which the probability is *p* that a random value would be lower.

Johnson Sb Density

Returns the density at *x* of a Johnson Sb distribution.

Johnson Sl Distribution

Returns the probability that a Johnson Sl-distributed random variable is less than *x*.

Johnson Sl Quantile

Returns the quantile whose value for which the probability is *p* that a random value would be lower.

Johnson Sl Density

Returns the density at *x* of a Johnson Sl distribution.

Tukey HSD Quantile

Accepts a probability argument *1-alpha*, and returns the *1-alpha*th quantile from Tukey's HSD test for the parameters you specify. The *alpha* argument is the significance level you want, *nGroups* is the number of groups in a study, and *dfe* is the error degrees of freedom (based on the total study sample). This is the quantile used to calculate least significant difference in Tukey's multiple comparisons test.

Tukey HSD P Quantile

Returns the *p*-value from Tukey's HSD multiple comparisons test.

F Power and F Sample Size

The **F Power** function calculates the power from a given situation that involves an *F*-test or *t*-test, and the **F Sample Size** function computes the sample size. The arguments are the values you specify for computation of a prospective power analysis. (These functions perform the same computations as if you selected **DOE > Sample Size and Power**. See the *JMP Design of Experiments* for a discussion of power and sample size.) The arguments include:

- **alpha** The significance level you are willing to tolerate (often 0.05).
- **dfh** The hypothesis degrees of freedom. It is one (1) for a *t*-test.
- **dfm** The model degrees of freedom (such that *dfe* = *n* – *dfm*).
- **SquaredSize** The squared effect size scaled by the error variance, which is used for making the noncentrality argument for the *F*-distribution. For this argument, use squared size = Δ^2/σ^2 where σ^2 is the error variance. That is, use:

  $\Delta^2 = (\bar{x} - \mu)^2$ for a one-sample *t*-test

  $\Delta^2 = \frac{(\bar{x}_1 - \bar{x}_2)^2}{2}$ for a two-sample *t*-test

  $\Delta^2 = \sqrt{\sum_{i=1}^{k} \frac{(\bar{x}_i - \bar{x})^2}{k}}$ for a *k*-sample *F*-test
- **n** (found only in the **F Power** function) The total number of observations (runs, experimental units, or samples) you expect to have. Power (in the **F Sample Size** function) is the probability you want to have of declaring a significant result.

Discrete Probability Functions

Gamma Poisson Probability

Returns the probability or pmf that a gamma-Poisson distributed random variable is equal to *x*. In general, the gamma Poisson functions accept arguments that are the mean parameter *lambda*, the overdispersion parameter *sigma*, and the count of interest *x*. When the overdispersion is equal to one, the Gamma Poisson reduces to a Poisson(*lambda*) distribution.

Gamma Poisson Distribution

Returns the probability that a gamma-Poisson distributed random variable is less than or equal to *x*. In general, the gamma Poisson functions accept arguments that are the mean parameter *lambda*, the overdispersion parameter *sigma*, and the count of interest *x*.

Gamma Poisson Quantile

Returns the quantile, which is the percentile of the probability of observing a gamma Poisson(lambda, sigma) random variable of equal or smaller value.

Binomial Distribution

Returns the probability that an observation from a binomial distribution with parameters *p* and *n* is less than or equal to *k*. In general, the binomial functions accept arguments that are the probability of success *p* (the event of interest), the number of trials *n*, and the number of successes *k*.

Binomial Probability

Computes the probability that a random variable from a binomial distribution is equal to *k*. In general, the binomial functions accept arguments that are the probability of success *p* (the event of interest), the number of trials *n*, and the number of successes *k*.

Binomial Quantile

Returns the quantile, which is the percentile of the probability of observing a binomial(p, n) random variable of equal or smaller value.

Neg Binomial Distribution

Computes the probability that a random variable from a negative binomial distribution is less than or equal to *k*. In general, the negative binomial functions accept an argument that is the probability of success *p*, a number of successes *r*, and the count of interest *k*, which is the number of failures that precede the i^{th} success.

Neg Binomial Probability

Computes the probability that a negative binomially distributed random variable is equal to *k*, where *r* is the number of successes and *p* is the probability of success for each trial. This is the probability that the number of failure becomes *k* until the number of success becomes just *r*.

Beta Binomial Distribution

Returns the probability or pmf that a beta binomially distributed random variable is less than or equal to *x*. In general, the beta binomial functions accept arguments that are the probability of success *p* (the event of interest), the overdispersion parameter *delta*, and the number of trials *n*. When the overdispersion parameter for the beta binomial is zero, the distribution reduces to a binomial(p, n).

Beta Binomial Probability

Returns the probability or cmf that a beta binomially distributed random variable is equal to *x*. When the overdispersion parameter for the beta binomial is zero, the distribution reduces to a binomial(p, n).

Beta Binomial Quantile

Returns the quantile, which is the percentile of the probability of observing a beta binomial(p,n) random variable of equal or smaller value. When the overdispersion parameter for the beta binomial is zero, the distribution reduces to a binomial(p, n).

Hypergeometric Distribution

Computes the probability that a random variable from a hypergeometric distribution is less than or equal to *x*. The hypergeometric distribution models the total number of successes in a fixed sample drawn without replacement from a finite population. The hypergeometric functions accept as arguments the size of the population *N*, the total number of items with the desired characteristic in the population, *K*, the number of samples drawn *n*, and the number of successes in the sample *x*.

Hypergeometric Probability

Computes the probability that a random variable from a hypergeometric distribution is equal to *x*.

Poisson Distribution

Computes the probability that a random variable from a Poisson distribution with mean lambda is less than or equal to the count of interest. In general, Poisson functions accept an argument that is the count of interest, and lambda, the mean parameter.

Poisson Probability

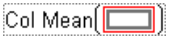
Computes the probability that a random variable from a Poisson distribution with mean lambda is equal to the count of interest.

Poisson Quantile

Returns the quantile, which is the percentile of the probability of observing a poisson(lambda) random variable of equal or smaller value.

Statistical Functions

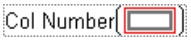
See the *JMP Scripting Guide* for details about syntax.

Col Mean 

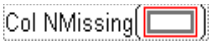
Calculates the mean (or arithmetic average) of the numeric values identified by its argument. The formula **Col Mean(age)** calculates the average of all nonmissing values in the **age** column.

Col Std Dev

Measures the spread around the mean of the distribution identified by its argument. In the normal distribution, about 68% of the distribution is within one standard deviation of the mean, 95% of the distribution is within two standard deviations of the mean, and 99% of the distribution is within three standard deviations of the mean.

Col Number 

Counts the number of nonmissing values in the column you specify. A missing numeric value occurs when a cell has no assigned value or is the result of an invalid operation (such as division by zero). Missing values show on the spreadsheet as a missing value mark (•). Missing character values are null character strings. In formulas for row state columns, an excluded row state characteristic is treated as a missing value. The formula editor interprets other missing values according to their data types.

Col N Missing 

Counts the number of missing values in the column you specify. A missing numeric value occurs when a cell has no assigned value or is the result of an invalid operation (such as division by zero). Missing values show in the data grid with a missing value character (•). Missing character values are null character strings.

Col Sum

Computes the sum of the values in its numeric argument. Missing values are ignored.

Col Minimum and Col Maximum

Takes the minimum of its numeric arguments. **Col Minimum** ignores missing values. **Col Maximum** takes the maximum of a numeric column argument and ignores missing values.

Col Quantile

Computes the value at which a specific percentage of the values is less than or equal to that value. For example, the value calculated as the 50% quantile, also called the median, is greater than or equal to 50% of the data. Half of the data values are less than the 50^{th} quantile.

The **Col Quantile** function's quantile argument represents the quantile percentage divided by 100. The 25% quantile, also called the lower quartile, corresponds to $p = 0.25$, and the 75% quantile, called the upper quartile, corresponds to $p = 0.75$.

The formula editor computes a quantile for a column of n nonmissing values by arranging the values in ascending order. The subscripts of the sorted column values, $y_1, y_2,\ldots,y_n$, represent the ranks in ascending order.

The p^{th} quantile value is calculated using the formula $p(n + 1)$ where p is the quantile and n is the total number of nonmissing values. If I is an integer, then the quantile value is $y_p = y_i$. If I is not an integer, then the value is interpolated by assigning the integer part of the result to i, and the fractional part to f and by applying the formula $qp = (1 - f)y_i + (f)y_{i+1}$.

For example, suppose a column has values 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20. The 50% quantile is calculated as `0.5(10 + 1) = 5.5`.

Because the result is fractional, the 50% quantile value is interpolated as

(1 – 0.5) x 10 + (0.5) x 12 = (0.5)10 + (0.5)12 = 6 + 5 = 11

The following are example **ColQuantile** formulas:

- **ColQuantile(age, 1)** Calculates the maximum age.
- **ColQuantile(age, 0.75)** Calculates the upper quartile age.
- **ColQuantile(age, 0.5)** Calculates the median age.

- **ColQuantile(age, 0.25)** Calculates the lower quartile age.
- **ColQuantile(age, 0)** Calculates the minimum age.

The **ColQuantile** argument can be any expression that evaluates to a value between (and including) 0 and 1. For example, the first formula in Figure C.15 calculates quantile values of age in ascending order for each row. The column then contains the interpolated values of **age** in ascending order in the calculated column. The second formula lists the interpolated values of age in descending order.

Figure C.15 Examples of the Quantile Function

$$\text{Col Quantile}\left[age, \frac{(\text{Row}()-1)}{(\text{NRow}()-1)}\right] \qquad \text{Col Quantile}\left[age, \frac{(\text{NRow}()-\text{Row}())}{(\text{NRow}()-1)}\right]$$

Col Standardize Col Standardize( )

Performs the usual standardization on its numeric expression. For each row *i*, **Col Standardize(height)** is **(HeightRow()–Col Mean(Height))/Col Std Dev(Height)**.

Mean Mean( )

Calculates the arithmetic average of the nonmissing arguments you specify. The arguments can be constants, numbers, or expressions. The **Mean** function initially shows with a single argument. You add arguments with the insert button ( ) on the formula editor keypad or by typing a comma.

Std Dev Std Dev( )

Computes standard deviation of the list of arguments you specify. The arguments can be constants, numbers, or expressions. The **Std Dev** function initially shows with a single argument. You add arguments by clicking the insert button ( ) on the formula editor keypad or by typing a comma.

Number Number( )

Counts the number of nonmissing values in the list of arguments you specify.

Sum Sum( ) Sum(, ,)

Returns the sum of the arguments.

Quantile Quantile(0.1 , , ,)

Calculates the quantile given by its first argument for all the following arguments given.

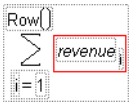
Summation (Σ)

Evaluates for an explicit range of values in a column, as given by the summation indices, as opposed to all other statistical functions (except **Product**), which *always* evaluate *on every row.* The **Summation** function uses the summation notation shown in Figure C.16. To calculate a sum, replace the missing *body* term with an expression containing the index variable *i*, or an index variable you assign. **Summation** repeatedly evaluates the expression for $i = 1$, $i = 2$, through $i =$ **NRow()** and then adds the nonmissing results together to determine the final result.

You can replace **NRow()**, the number of rows in the active spreadsheet, and the index constant, *i*, with any expression appropriate for your formula. For example, the summation formula in Figure C.16

computes the total for each row of all revenue values for rows 1 through the current row number, filling the calculated column with the cumulative totals of the revenue column.

Figure C.16 Example of the **Summation** function



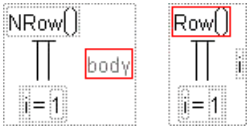
Product (Π)

Evaluates for an explicit range of values in a column, as given by the summation indices, as opposed to all other statistical functions (except **Summation**), which *always* evaluate *on every row*. **Product** uses the notation shown in the formulas on the right in Figure C.17. To calculate a product, replace the missing body term with an expression containing the index variable *j*. **Product** repeatedly evaluates the expression for $i = 1$, $i = 2$, through $i = n$ and multiplies the nonmissing results together to determine the final result.

You can replace **NRow()**, the number of rows in the active spreadsheet and the index constant, *i*, with any expression appropriate for your formula.

For example, the expression second product example in Figure C.17 calculates $i!$ (each row number's factorial).

Figure C.17 Examples of the **Product** Function



Minimum and Maximum

Return the minimum and maximum value, respectively, from the list of nonmissing arguments you specify.

N Missing

Counts the number of missing values in the list of arguments you specify.

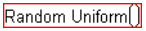
Desirability

Are smooth piecewise functions that are crafted to fit the control points. The minimize and maximize functions are three-part piecewise smooth functions that have exponential tails and a cubic middle.

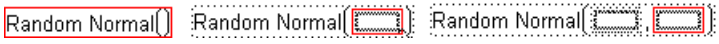
The target function is a piecewise function that is a scale multiple of a normal density on either side of the target (with different curves on each side), which is also piecewise smooth and fit to the control points.

Random Functions

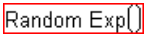
You can create formulas that generate real numbers by effectively "rolling the dice" within the constraints of the specified distribution. The random numbers are generated using the Mersenne-Twister technique. See Matsumoto and Nishimura (1998) in the reference section of the *JMP Statistics and Graphics Guide* for details. Also see the *JMP Scripting Guide* for details about syntax.

Random Uniform 

Generates random numbers uniformly between 0 and 1. This means that any number between 0 and 1 is as likely to be generated as any other. The result is an approximately even distribution. You can shift the distribution and change its range with constants. For example, `5 + Random Uniform()*20` generates uniform random numbers between 5 and 25.

Random Normal 

Generates random numbers that approximate a normal distribution with a mean of 0 and standard deviation of 1 if no arguments are used, or with the mean and standard deviation entered as arguments. The normal distribution is bell shaped and symmetrical. You can also modify the `Random Normal` function with constants if no arguments are entered to give a normal distribution with specific mean and standard deviation. For example, the formula `Random Normal()*5 + 30` generates a random normal variable with a mean of 30 and a standard deviation of 5.

Random Exp 

Generates a single parameter exponential distribution for the distribution parameter lambda=1. You can modify the exponential function to use a different lambda.

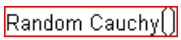
For example, `Random Exp()/.1` generates an exponential distribution for lambda=0.1. The exponential distribution is often used to model simple failure time data, where lambda is the failure rate.

Random Gamma

Gives a gamma distribution for the parameter, **alpha**, you enter as the function argument. The gamma distribution describes the time until the k^{th} occurrence of an event. The gamma distribution can also have a scale parameter, **beta**. A gamma variate with shape parameter alpha and scale beta can be generated with the formula **beta*Random Gamma(alpha)**. If **2*alpha** is an integer, a Chi-squared variate with **2*alpha** degrees of freedom is generated with the formula **2*Random Gamma(alpha)**.

Random Beta

Generates a pseudo-random number distributed Beta(alpha, beta).

Random Cauchy 

Generates a Cauchy distribution with location parameter 0 and scale parameter 1. The Cauchy distribution is bell shaped and symmetric but has heavier tails than the normal distribution. A Cauchy variate with location parameter alpha and scale parameter beta can be generated with the formula `alpha+beta*Random Cauchy()`.

Random Johnson Su

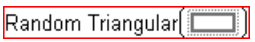
Returns a random number from the Johnson Su distribution.

Random Johnson Sb

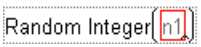
Returns a random number from the Johnson Sb distribution.

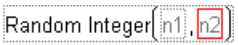
Random Johnson Sl

Returns a random number from the Johnson Sl distribution.

Random Triangular 

Generates a triangular distribution of numbers between 0 and 1, with the midpoint you enter as the function argument. You can add a constant to the function to shift the distribution and multiply to change its span.

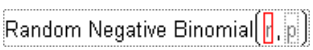
Random Integer 



Generates a uniform distribution of integers between 1 and the argument you enter as **n1**, if nothing is entered for **n2**. If you enter both **n1** and **n2 (n1<n2)**, **Random Integer** generates a uniform distribution of the integers between and including **n1** and **n2**.

Random Binomial

Generates random numbers from a binomial distribution with parameters you enter as function arguments. The first argument is *n*, the number of trials in a binomial experiment. The second argument is *p*, the probability that the event of interest occurs. When *n* is 1, the binomial function generates a distribution of Bernoulli trials. For example, $n = 1$ and $p = 0.5$, give the distribution of tossing a fair coin. The mean of the binomial distribution is np, and variance is $np(1 - np)$.

Random Negative Binomial 

Generates a negative binomial distribution for the parameters you enter as function arguments. The first parameter is the number of successes of interest (r) and the second argument is the probability of success (p). The random variable of interest is the number of failures that precede the i^{th} success. In contrast to the binomial variate, where the number of trials is fixed and the number of successes is variable, the negative binomial variate is for a fixed number of successes and a random number of trials. The mean of the negative binomial distribution is $(r(1 - p))/p$ and the variance is $(r(1 - p))/p^2$.

Random Beta Binomial

Returns random numbers from the beta binomial distribution for *n* trials with probability *p* and correlation or overdispersion *delta*.

Random Geometric

Returns random numbers from the geometric distribution with the parameter you enter as the function argument. The parameter, *p*, is the probability that a specific event occurs at any one trial. The number of trials until a specific event occurs for the first time is described by the geometric distribution. The mean of the geometric distribution is $(1\text{-}p)/p$, and the variance is $(1 - p)/p^2$.

Random Poisson Random Poisson(lambda)

Generates a Poisson variate based on the value of the parameter, lambda, you enter as the function argument. Lambda is often a rate of events occurring per unit time or unit of area. Lambda is both the mean and the variance of the Poisson distribution.

Random Gamma Poisson Random Gamma Poisson(lambda, sigma)

Returns random numbers from the gamma Poisson distribution with parameters *lambda* and *sigma*.

Random Weibull Random Weibull()

Returns a random number from a Weibull distribution.

Random Lognormal Random Lognormal()

Returns a Lognormal-distributed random number with location parameter *mu* and scale parameter *sigma*.

Random GLog Random GLog(mu, sigma, lambda)

Returns random numbers from the generalized logarithm distribution with parameters *mu*, *sigma*, and *lambda*. When *lambda* is equal to zero, the function returns a lognormal(*mu*, *sigma*).

Random Reset Random Reset()

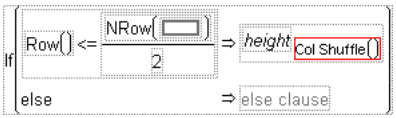
Restarts the random number sequences with a seed you specify.

Col Shuffle Col Shuffle()

Selects a row number at random from the current data table. Each row number is selected only once. When **Col Shuffle** is used as a subscript, it returns a value selected at random from the column that serves as its argument. Each value from the original column is assigned only once as **Shuffle**'s result.

For example, to identify a 50% random sample without replacement, use the formula in Figure C.18.

Figure C.18 Formula Identifying 50% Random Sample



The formula in Figure C.18 selects half the values ($n/2$) from the column *x* and assigns them to the first half of the rows in the computed column. The remaining rows of the computed column fill with missing values.

Resample Freq ResampleFreq()

Generates a random selection with replacement frequency counts, suitable for use in bootstrapping. For example, it supports a second **Freq Column** argument, enabling it to do bootstrap samples relating to a pre-existing frequency column specified in the second argument. `Resample Freq()` generates 100% resample. `Resample Freq(fraction)` generates `fraction*nrow` frequency sample, and `Resample Freq(n)` generates an `n*nrow` frequency sample.

Date Time Functions

See the *JMP Scripting Guide* for details about syntax.

In Minutes, In Hours, In Days, In Weeks, In Years

In Minutes(minutes) In Hours(hours) In Days(days) In Weeks(weeks) In Years(▭)

Converts from the units of the function name to the equivalent number of seconds for the argument. The argument must be a number or numeric expression. For example, **In Minutes(2)** yields **120**, and **In Years(1)** yields **31,557,600** (60 seconds * 60 minutes * 24 hours * 365.25 days).

Date DMY, Date MDY

Date DMY(day, month, year) Date MDY(month, day, year)

Accepts numeric expressions for day, month, and year and return the associated JMP date. For example, **Date DMY (20, 3, 1991)** and **Date MDY(3, 20, 1991)** evaluate to **2,752,272,000**.

Today

Today()

Returns the number of seconds between January 1, 1904 and the current date. For example, at midnight on March 20, 1991 (a Wednesday), the **Today** function returns **2752272000** (2,752,272,000 seconds) and continues counting. If you evaluate the **Today** function later in the day, it reflects the additional seconds.

Day, Month, Year

Day(date) Month(date) Year(date)

Returns the day of the month, the month (as a number from 1 to 12), and a four-digit year, respectively. The argument for these functions is interpreted as a JMP date. For example, on March 20, 1991:

- **Day(2752272000)** returns the number **20**.
- **Month(2752272000)** returns the number **3**.
- **Year(2752272000)** returns the number **1991**.

Hour, Minute, Second

Hour(date) Minute(date) Second(date)

Returns the hour, the minute, and the seconds of a date-time value, respectively. The argument for these functions is interpreted as a JMP date. For example, on March 20, 1991:

- **Day(2752572649)** returns the number **11**.
- **Month(2752572649)** returns the number **30**.
- **Year(2752572649)** returns the number **49**.

Day of Week, Day of Year, Week of Year, Time of Day

Day Of Week(date) Day Of Year(date) Week Of Year(date) Time Of Day(▭)

The argument for these functions is a JMP date. **Day Of Week** returns a number from 1 to 7, where 1 represents Sunday. **Day Of Year** returns the number of days from the beginning of the year. **Week Of Year** returns a number from 1 to 52. **Time Of Day** returns a number from 0 to 86399 (time of day in seconds). For example, on Wednesday, March 20, 1991:

- **Day Of Week(2752272000)** returns the number **4**.
- **Day Of Year(2752272000)** returns the number **79**.

- **Week Of Year(2752272000)** returns the number **12**.
- **Time Of Day(2752272000)** returns the number **0**.

Informat Informat(string, formatName)

The argument for the **Informat** function is a date character string. For example, **Informat("03/20/1991")** returns the appropriate JMP date value, **2752272000**. JMP can read all the date formats except for **Abbrev Date** and **Long Date**.

Abbrev Date, Long Date, Short Date Abbrev Date(date) Long Date(date) Short Date(date)

The argument for these date functions is a JMP date. They return character strings that are the formatted representation of the argument. For example:

- **Abbrev Date(2752272000)** returns **Wed, Mar 20,1991**.
- **Long Date(2752272000)** returns **Wednesday, March 20, 1991**.
- **Short Date(2752272000)** returns **3/20/91**.

Format Format(number, formatName) Format(number, formatName,)

The first argument in the **Format** function is a JMP date. This function returns the character string representation of the date by the date format you specify in the second argument, which is a quoted string. If you apply this formula to a numeric column, JMP automatically changes the column's data type to character.

You can also supply a column for the first argument and leave the rest blank. The result is the formatted value of the column reference. This can be used to extract value labels of a column when the value labels are turned off.

MDYHMS MDYHMS( )

The argument of **MDYHMS** is a JMP date. This function shows all date and time fields, appending zeros as time fields if no time information is present. This is useful if a date column is formulated such that not all date information is displayed. The **MDYHMS** function can be used to see all available date and time information.

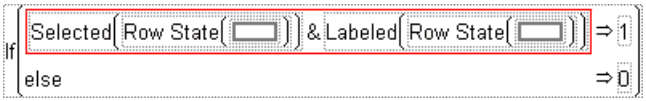
Row State Functions

There are six characteristics that rows in a data table can have: selected, hidden, excluded, labeled, colored, and marked. If you give rows one or more of these characteristics and then create row state data table columns, you can then create a formula that computes and saves row state conditions. (See "Assigning Characteristics to Rows and Columns," p. 131, and "Using Row State Columns," p. 165, for more details.)This formula processes row state data just as it would process character and numeric data. See the *JMP Scripting Guide* for details about syntax.

Row State Row State( )

Returns the active row state condition of the current row as true or false. You can use this function to conveniently write conditional clauses that depend on the status of the current row. For example, Figure C.19 assigns a 1 to rows that are currently selected and labeled and 0 otherwise.

Figure C.19 Row State



As Row State As Row State( )

Converts a numeric argument to a row state or set of row state conditions. Row states are stored internally in JMP as a 16-bit number, with each bit assigned to represent one of the possible row states as illustrated in Figure C.2. For example, the binary representation of **1327** is **0000010100101111**. **As Row State(1 3 2 7)** would therefore set the row state as selected, excluded, hidden, labeled, with marker 2 and color 10.

Combine States Combine States( ) Combine States(, ,)

Generates a row state combination with two or more arguments. Use the insert button ( ) on the formula editor keypad or type a comma to add arguments to the **Combine States** function. The currently selected expression becomes the first argument when you select **Combine States**. Replace each argument with an expression that evaluates to a row state. This formula:

```
Combine States(
Selected State(Modulo(Row(),2),
Labeled State(Modulo(Row()+1,2))
```

alternately labels or selects each row in the calculated row state column. The **Selected State** and **Labeled State** functions are defined later in this section. Use the insert ( ) and delete ( )buttons on the formula editor keypad to add more arguments or remove unwanted arguments.

If you include conflicting row states in a combination, the results are unpredictable.

Excluded State

Interprets a numeric argument as true or false. When an argument evaluates as true, the **Excluded State** function assigns the excluded condition as the value of the column for that row. For example, **Excluded State(Modulo(Row(),2))** assigns the excluded row state as the value of the row state column for each odd numbered row.

Hidden State

Assigns the hidden row state condition when its argument is greater than zero. If the argument is zero, the value in the column for that row is not hidden.

Labeled State

Gives the labeled row state condition when its argument is greater than zero. If the argument is zero the row value in the column for that row is not labeled.

Color State

Returns the color from the JMP color map that corresponds to its integer argument. JMP colors are numbered 0 through 84. Zero maps to black.

Marker State

Returns markers from the JMP marker map that correspond to its integer argument. JMP markers are numbered 0 through 16. The formula **Marker State(Row())** assigns all the row state markers in a

repeating sequence determined by the current row number to the calculated row state column. A row state column can have multiple row states as a value.

Selected State

Gives the selected row state condition when its argument is greater than zero. If the argument is zero, the value in the column for that row is not selected.

Hue State

Returns the color from the JMP hue map that corresponds to its integer argument. JMP hues are numbered 0 through 11 but larger integers are treated as *modulo* 12. The **Hue State** function does not map to black, gray, or white. A hue of zero maps to red and hue of 11 maps to magenta. The formula on the left in Figure C.20 assigns row state colors in a chromatic spread based on the value of *z*. The **Hue State** function used with a row state data type column.

Shade State

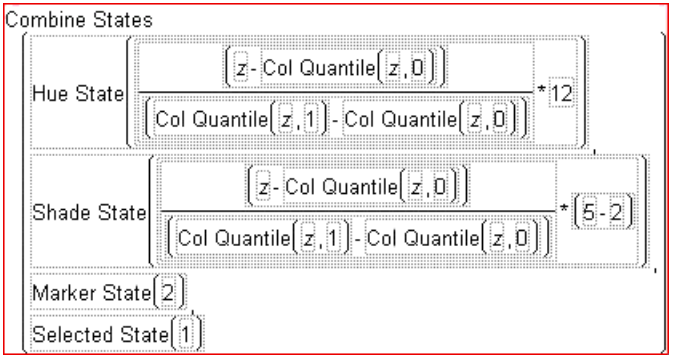
Assigns five shade levels to a color or hue. A shade of –2 is darkest and shade of +2 is lightest. A shade of zero is a pure color. The formula on the right in Figure C.20 assigns shade values based on the value of *z*.

Figure C.20 Examples of Hue and Shade Functions

Hue State
z - Col Quantile(z, 0)
Col Quantile(z, 1) - Col Quantile(z, 0)
* 12
Shade State
z - Col Quantile(z, 0)
Col Quantile(z, 1) - Col Quantile(z, 0)
* (5 - 2)

To assign all shades of all the colors in the colors palette, you need to use the **Hue State** and **Shade State** assignments together. The formula in Figure C.21 uses the **Combine States** function described at the beginning of this section. The first argument in the **Combine States** function is the **Hue State** formula shown previously, and the second argument is the **Shade State** formula. In addition, the **Marker State** function with an argument of 2 assigns the **X** marker to each row, and the **Selected State** function with an argument of 1 selects each row.

Figure C.21 Combine States Example For Using Both Hue State and Row State


Combine States
Hue State
z - Col Quantile(z, 0)
Col Quantile(z, 1) - Col Quantile(z, 0)
* 12
Shade State
z - Col Quantile(z, 0)
Col Quantile(z, 1) - Col Quantile(z, 0)
* (5 - 2)
Marker State(2)
Selected State(1)

Excluded, Hidden, Labeled, and Selected

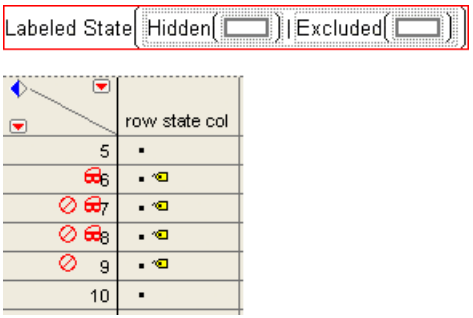
Accepts a row state expression argument (row state column or row state constant) that evaluates as either 1 or 0 (true or false). These characteristics are inactive by default. Often, the **Row()** function is

the argument, which detects the active row state condition of each row. For example, in Figure C.22, the formula assigns 99 whenever a row is actively selected, and 0 otherwise. Note that this formula is used in a column that has a numeric data type.

Figure C.22 Example of a Formula Using the **Selected** Function

The example in Figure C.23 assigns row state conditions to a row state column. The formula for the row state column (in the columns called row state col) checks to determine whether the active row state is either **Hidden** or **Excluded**, and if so, assigns the **Labeled** row state.

Figure C.23 Calculate Row State Information in a Row State Column



Color Of

Accepts any row state expression or column, or the **Row State()** function as its argument and returns a number from the JMP color map that corresponds to the active color state, or a missing value if there is no assigned color.

Marker Of

Accepts any row state expression or column, or the **Row State()** function as its argument and returns a number from the JMP marker map that corresponds to the active marker or a missing value if there is no assigned marker.

Table C.2 Row States Stored as 16-Bit Numbers: Each Bit Represents a Row State

Bit	Row State
0	Not selected (0) or Selected (1)
1	Unexcluded (0) or Excluded (1)
2	Unhidden (0) or Hidden (1)
3	Unlabeled (0) or Labeled (1)
4-7	Marker
8-14	Color

Assignment Functions

Assignment functions work in place. That is, the result returned by the operation (on the right of the operator) is stored in the argument on the left of the operator and replaces its current value.

Assignment statements are most often used in conjunction with other commands to build a JSL script. See the *JMP Scripting Guide* for details about syntax.

= (assign) Puts the value of *b* into *a*. For example, (*a*=*b*).

+= (add to) Adds the value of *b* to *a* and puts the result back into *a*. For example, *a*+=*b*.

-= (subtract to) Subtracts the value of *b* and puts the result back into *a*. For example, *a*–=*b*.

***= (multiply to)** Multiplies *b* with *a* and puts the result back into *a*. For example, *a**=*b*.

/= (divide to) Divides *b* into *a* and puts the result back into *a*. For example, *a*/=*b*.

++ (post increment) Adds one (1) to *a*, in place, so that *a*++. For example, if the initial value of *a* is 4, the expression *a*++ changes a to 5.

-- (post decrement) Subtracts one (1) from *a*, in place, so that *a*– – . For example, if the initial value of *a* is 4, the expression *a*– – changes a to 3.

Parametric Model Functions

This category is a short cut to create three parametric models that are linear functions of set of window-selected columns.

Linear Model, Interactions Model, Full Quadratic Model

Selecting each of these opens a column selection box that lets you select one or more columns to be included in the model. The function then creates and populates the chosen model.

Index

JMP User Guide

Symbols

468
! (Not) function 471
!= (not equal to) function 468
& (And) function 470
& (And) function and conditional clauses 470
*= (Multiply To) function 493
+= (Add to) function 493
.gif 121
/= (Divide To) function 493
= (Assign) function 493
== (equal to) function 468
> (greater than) function 468
>= (greater than or equal to) function 468
? tool 3, 5, 445
^. *See* Insert button on keypad
| (Or) function 470
| (Or) function 470

Numerics

1, 2, and 4-byte integers 61
3D scatterplots
  menu item 440

A

A tool. *See* annotate tool
Abbrev Date function 489
about JMP 451
Abs function 457
Add Database Query 126
Add Document 126
Add Folder 126
add ranges
  missing values 149
Add SAS Stored Process 127
Add to (+=) function 493
Add URL 126
Add Window 126
adding
  columns 67–68, 430
  graphics and graphics scripts 216
  rows 66, 430
  statistics columns 266
Aggregate functions (SQL) 32
aligning elements in layout view 452
allowing short numeric formats 61, 337
analysis roles 138
Analyze
  menu 434
  toolbar 355
And (&) function 470
And (&) function and conditional clauses 470
annotate tool 211, 446
annotations
  creating 211
  setting the default font 345
appending horizontally. *See* joining
appending tables. *See* concatenating tables
ArcCosH function 460
ArcCosine function 459
ArcSine function 459
ArcSinH function 460
ArcTangent function 459
ArcTanH function 460
arguments
  definition 328
  opening and closing 320
arithmetic buttons on keypad 293
arranging icons and windows on desktop 448
arrays. *See* Taguchi Arrays
Arrhenius function 459
Arrhenius Inv function 459
arrow
  cursor tool 57, 444
  double arrow tool 58
As Row State function 307, 490
Assign (=) function 493
Assignment functions 309, 493
assignment table property 184
asterisk beside p-values 176

asterisk icon 53, 140
attaching tables. *See* concatenating tables
attributes, standardizing 164
Augment Design 415, 433
Auto-save the report to command 340
axis
  adjusting 171, 200, 445
  copying and pasting settings 205
  customizing 200
  divider lines and frames 209
  gridlines 206
  increments 202
  labels 203, 345
  minimum and maximum values 202
  numeric format 201
  scale 200
  scrolling 199
  specifications for columns 149
  tick marks 205

B

background colors 197, 342–343
backwards compatibility 109–110, 342
bar chart. *See* plots and graphs
bars, histogram colors 197
base e 457
Basic category on JMP Starter 401–402
beginners tutorial 3
Bernoulli trials 486
best numeric formats 63
Beta Binomial Distribution function 480
Beta Binomial Probability function 481
Beta Binomial Quantile function 481
Beta Density function 472
Beta Distribution function 472
Beta function 458
Beta functions 458
Beta Quantile function 472
BETWEEN statement (SQL) 32
beveled report tables 182
Big Class.jmp 321, 325
Binomial Distribution function 480
Binomial Probability function 480
Binomial Quantile function 480
Bivariate button on JMP Starter 402
Blink button in row editor 82
Blob to Char function 465
boarders, adding to report tables 181
books of JMP documentation 451
bouncing selection rectangle 186
boxes around formulas 318
Break function 471
browser toolbar 37–38, 356
brush tool 186, 445
building formulas 287
buttons, adding to toolbars 362
By Matching Columns option. *See* joining

C

Car poll.jmp 276
Cartesian join. *See* joining
cascading windows 448
Categorical 437
Categorical Color Theme 339
categorical modeling 404
category on JMP Starter 415
Cauchy distribution 485
Ceiling function 457
cell formulas 71
cell plots 441
Change Item Label 278
Char function 460
Char to Blob function 465
Char to Hex function 463
character data types 58
Character functions 460–465
Character Pattern functions 465–467
character sets 109–110, 342
characteristics, rows and columns 131–140
Chart button on JMP Starter 408
Chart menu item 440
charts
  Control 442
  Gauge 443
  See also plots and graphs
  Variability 443
ChiSquare Density function 472
ChiSquare Distribution function 473
ChiSquare Quantile function 473
Choice 437
Choice 404
Choose function 470
circle with strikethrough icon 54, 131
clauses 328
cleaning data 72
cleaning up layout of windows 452
closing
  all windows 448
  files 422
  JMP Starter window 9–10

levels in a report 171
reports 340
reports, default action 340
sessions 340
cluster, scroll bars 336
clustering, hierarchical and K-means 405, 438
coding, column property 153
Coefficient of Variation 267
Col functions 482, 487
Col Maximum function 482
Col Mean function 481
Col Minimum function 482
Col N Missing function 482
Col Number function 482
Col Quantile function 482
Col Shuffle function 487
Col Standardize function 483
Col Std Dev function 481
Col Sum function 482
Color function 308
Color Of function 492
Color State function 308, 490
Color Theme 136, 151
color values 151
Colors 136
colors
backgrounds 197, 342–343
graphs 342
histogram bars 197
markers 188
ranges across values 151
rows and columns 134, 428
shapes added to reports 213–216
toolbars 357
windows 343
Cols menu 430
column
factor changes (DOE) 158
Column Info menu item 430
column property
distribution 161
column tables 276
columns
adding 67–68, 430
adjusting widths 49
attributes 164
axis specifications 149
characteristics 131–140
context menu 79
control limits 156
deleting 67
design roles 158
duplicating 80
excluding 131
factors for mixture experiments 154
fonts used in headings 345
formulas 142, 287
hiding 132
joining 244
labeling 133
list checking 144
locking 138, 143
measuring units 160
moving 80
names 49, 72
notes 143
order of data in reports 155
panel 53–54
preselected analysis roles 138
properties 140, 163–164
range checking 146
reordering 77, 79, 431
response limits 156
row state 165–166
selecting 90–91
showing and hiding in report tables 181
Sigma values 159
Sort command 79
sorting 77, 79, 431
source column 242
spec limits 156
splitting 232
stacking 227
transposing 237
validating data 144–147
value labels 147
columnwise statistics functions 305
Combine States function 307, 490
communications settings 36, 347
Compare column 94
Comparison functions 301, 467–468
compositional data. *See* Ternary Plots
Comuserve Graphics Interchange Format. *See* GIF
Concat function 460
Concat Items function 464
concatenating tables 241, 427
conditional clauses 302
Conditional functions 302, 468–471
Connections, database. *See* database connection
constants, inserting in formulas 290
Contains function 460

context menu for rows and columns 79
Contingency button on JMP Starter 402
Continue function 471
Continuous Color Theme 339
continuous modeling types 59
Continuous Scale command 194
contour plot 409, 441
contour profiler. *See* Profiler
Control category on JMP Starter 412
Control Charts 442
control limits 156
Copy As SAS Formula 317
Copy Formula button, using when
  creating a subset 224
  joining tables 224, 229, 233, 246
copying
  axis frame settings 205
  graph contents 204
  pasting 79, 346, 425
  row states 167
  text 122, 178, 425
copying with labels (column names) 80
correcting mistakes in formulas 316
correlations. *See* Multivariate menu item
CosH function 460
Cosine function 459
Count (in a formula) 456
Count column 74
Count function 455
creating source columns (when concatenating tables) 242
crosshairs tool 199, 446
Currency 141
Currency Formats 141
currency formats 63
cursor forms 57, 444
Custom Design
  button on JMP Starter 414
  menu item 432
customizing
  axes 200
  menus 366
  results 118
  See also preferences
  toolbars 354

D

data
  grid 49
  missing 73
  properties 140–163
  recoding 72
data feed. *See* communications settings
Data Filter 97
data tables
  concatenating 241, 427
  creating data table from report table 183
  creating new 10
  data grid 49–58
  editing 72–78
  elements of data tables 49
  joining 244
  locking 52, 83
  names and notes, placing on reports 338
  names, changing 83
  opening 11
  panels 49
  properties 51, 184
  saving 109
  sorting 225
  splitting 232
  stacking 227
  subsetting 223
  summarizing 263
  transposing 237
  updating 256
Data Tables List toolbar 356
data types
  character formats 58
  date and time formats 61
  numeric formats 61
  row states 58, 166
  specifying 58
data view
  created from rows panel 55
database connection 26–30, 113, 423
datafeed. *See* communications settings
Date DMY function 488
Date MDY function 488
Date Time functions 488–489
dates and times
  formats 61, 63
  in formulas 306
  inserting on report window 338
Day function 488
Day of Week function 488
Day of Year function 488
decreasing font sizes 175
decrypting scripts 425
defaults. *See* factory defaults
delete button, on formula editor keypad 293

delete expression 294
deleting
columns 67–68, 432
functions 316
rows 66, 430
delimited incoming data 15
dendrograms. *See* clustering
derivatives 312
descriptive statistics. *See* statistics columns
deselecting parts of a report 172
Design of Experiments. *See* DOE 153
design roles 139, 158
Design, table variable 51, 84
Desirability function 484
desirability values, as column properties 157
desktop, arranging icons 448
diagram
JMP Starter 412
diamond icon, on a report 172–173
Dif function 456
Digamma function 458
disclosure control. Emphasis> See diamond icon
discontiguous selection 90–91, 101
discrete probabilities, adding to formulas 304
Discrete Probability functions 480–481
Discriminant
menu item 439
discriminant
JMP Starter 406
DisplayBox scripting index 5, 451
distribution
column property 161
setting column property to automatically fit curve 161
Distribution button on JMP Starter 401
distribution type for column 161
Divide To (/=) function 493
DOE (Design of Experiments)
category on JMP Starter 413
coding 153
menu 432–434
toolbar 356
D-optimal design. *See* Custom Design
downsaving 109–110, 342
dragging and dropping
in data table 80
into formulas 316
into other programs 122, 177
drawing speed of markers 189
drawing tools 213–216
dropping
columns when splitting tables 233
columns when stacking tables 228
duplicates when joining tables 245
duplicating cells and columns 80
duration, time and numeric formats 66

E

Edit menu 424
Edit Notes 127
editing
column names 72
formulas 315
names of data tables 83
names of report tables 183
reports 172
rows, individually. *See* row editor
scripts or script names 89
table variables 86
tables 72–78
WHERE clauses 33
effect size. *See* Sample Size and Power
efficient evaluations 311
elements and element browser in formula 288, 328
eliminating missing rows (when stacking tables) 228
e-mailing tables or reports 38, 44
embossed report tables 182
encrypting scripts 425
End of Field and **End of Line** options 17
Ends With function 462
end-to-end merging. *See* concatenating tables
Enter Key moves down option 336
equal to (==) function 468
equation editor. *See* formula editor
errors, ignoring in formulas 314
Euclidean distances. *See* clustering
evaluating columns' formulas
viewing evaluations in formulas 315
when creating subsets 224
when joining tables 246
when splitting columns 233
when stacking columns 229
Example button
Index help 4, 451
examples, formulas 321
Excel
opening worksheets 333
Excel, importing data 22
Excel, selecting worksheets when opening 333

Excluded function 490–491
Excluded functions 307–308
excluded rows
  showing in a data view 55
excluding
  columns when splitting tables 233
  columns when stacking tables 228
  duplicates when joining tables 245
  rows and columns from analyses 131, 428–431
Execute this JSL option 364, 372
exiting JMP 424
Exp function 457
exponent button on keypad 294
export 117
exporting column names to text file 111, 350
exporting files 109, 114, 423
  journal 117
expressions 328
extreme vertices. *See* mixture design

F

F Density function 473
F Distribution function 474
F Power function 479
F Quantile function 474
F Sample Size function 479
factor
  column 158–159
  for mixture experiments 154
factor changes 158
factor, split plots 158
Factorial function 458
factory defaults
  menus 366
  min and max axis values 202
  paths (file locations) 348
fast marker
  drawing speed 189
  threshold 342
fat plus tool 57, 445
Fibonacci series 456
field widths
  in report tables 182
  of tick mark labels 207
file
  associations and locations 350
  formats 115
  locations preferences 348
File menu 399, 421–424
File System 127
File_Edit toolbar 355
files
  opening 109–110, 342
  saving without Unicode 109–110, 342
Files of type list 12
filling columns with data 69
filtering
  data 97
Find/Length expression 461
finding and replacing values 74
Finding values in a data table. *See* Search/Find
fit
  column property to draw automatically when analyzing distribution of column 161
Fit Life by X 439
Fit Life By X button on JMP Starter 406
Fit Model
  button on JMP Starter 403
  menu item 435
Fit Nonlinear
  button on JMP Starter 403
  See also nonlinear fit
Fit Y by X
  button on JMP Starter 402
  menu item 434
fixed
  decimal numeric formats 63
  widths 15
Floor function 457
foldover design. *See* Augment Design
font sizes, increasing and decreasing 175, 449
fonts, changing in
  data tables 49
  defaults 344
  reports 344
For function 471
For quantile statistics option when summarizing tables 265
Format function 489
formats
  graphics 346
  numeric. *See* numeric formats
formula editor 287–326
formula element browser 288, 291
Formula menu item 431
formulas
  arguments, opening and closing 320
  assignment functions 309
  boxes, hiding and showing 318
  cell expressions 71
  comparing values 301

conditional clauses 302
constants, adding 290
creating 142
types of formulas 287
data table elements, adding 288
dates and times, adding 306
discrete probabilities 304
editing 315
entering into cells 71
evaluating 310, 313, 334
examples 321
expressions 316
fonts 318, 345
functions, adding 294, 455
glossary of terms 327
JSL view 315
keyboard shortcuts 327
numeric terms, adding 297
opening and closing arguments 320
operators, adding 291
orientation in formula editor 319
quantiles and probabilities, adding 303
random numbers, generating 306
shortcuts, keyboard 327
statistical functions, adding 305
tutorials 321
viewing 315, 318
frame sizes of plots or graphs 196
Freq (Frequency). *See* preselected role
full factorial designs 415, 433
Full Quadratic Model function 493
function browser 294
function types
Add to (+=) 493
And 470
Assign (=) 493
Assignment 309, 493
Beta 458
Character 460
Character Pattern 465
Col 482, 487
Color 308
Color State 308
Combine States 307
Comparison 301, 467
Conditional 302, 468
Date Time 488
Discrete Probability 480
Divide To 493
Excluded 307–308
Hidden 308
Hidden State 307
Hue State 308
Is Missing 301
logarithmic 298
Marker 308
Match 325
Multiply To (*=) 493
Numeric 457
Parametric Model 493
Post Decrement (--) and Increment (++) 493
Probability 472
Random 485
Row 455
Row State 489
Shade State 308
Statistical 481
statistical 305
Transcendental 457
Trigonometric 459
trigonometric 298–458
functions 5
adding 294
aggregate (SQL) 32
columnwise statistics 305
deleting 316
glossary of terms 328
numeric 297
peeling 316
referencing rows 297
Row States 307

G

Gamma Density function 474
Gamma Distribution function 474
Gamma function 458
Gamma functions 458
Gamma Poisson Distribution function 480
Gamma Poisson Probability function 480
Gamma Poisson Quantile function 480
Gamma Quantile function 475
Gauge R&R. *See* Variability
Gaussian Process 436
gaussian process 404
general preferences 329
Generalized Linear Model 436
GIF 115
global variables, storing a report table 184
GLog Density function 476
GLog Distribution function 476
GLog Quantile function 476

glossary of formula terms 327
Go To command 95, 430
Go To Line command 426
Go To Row command 91, 94, 429
goals for DOE (Design of Experiments) response variables 157
grabber tool. *See* hand (grabber) tool
Graph
  marker sizes. *See* marker sizes
  menu 440–442
  See also plots and charts
  tab on JMP Starter 407
  toolbar 355
Graph Builder menu item 440
Graph Height 339
Graph Marker 339
Graph Marker Theme 339
graphics
  adding to reports 216
  adding to toolbars 364
  formats 346
  saving reports as graphics 121
  scripts 216
graphs
  colors 342
  copying and pasting contents 204
greater than (>) function 468
greater than or equal to (>=) function 468
Greek letters 345
grid. *See* data grid
gridlines 206
GROUP BY command (SQL) 33
grouping objects 451
grouping variables
  using when sorting tables 226
  using when splitting tables 232

H

hand (grabber) tool
  general definition 445
  using in formula editor 316
  using in reports 171
  using to scroll axes 199
hard (factor changes), factor, hard or easy to change 158
HAVING command (SQL) 33
Help
  menu 450
  question mark (?) tool 445
  using online Help 3, 5
Hex function 463
Hex to Blob function 465
Hex to Char function 463
Hex to Number function 463
Hidden function 490–491
Hidden functions 308
hidden rows
  showing in a data view 55
Hidden State function 307
hiding
  columns 132
  results 173
  rows 132, 428
  toolbars 354
  windows 449
hiding menu tips 338
hierarchical clustering. *See* clustering
higher dimensions. *See* Spinning Plots
Highlight Outline Headers option 343
highlight, direction of movement when pressing Enter/Return 336
highlighting. *See* selecting 90
histograms, bar colors 197
horizontal
  alignment in reports 171
  formula display 319
Hot Dogs.jmp 325
Hour function 488
Hover Help 339
HTML
  graphic formats for HTML files 346
Hue State function 308, 491
Hypergeometric Distribution function 481
Hypergeometric Probability function 481

I

I-beam cursors 57
icons
  arranging 448
  asterisk 53, 140
  circle with strikethrough 54, 131
  column characteristics 53, 139
  column properties 53, 141
  diamond (disclosure) 173
  list check 53, 144
  lock 53, 83
  mask 53–54, 132
  modeling types 53
  plus 53, 143
  preselected roles 139

range check 53
red triangle 178
tools 444
window icons 448
yellow tag 53, 133
ID column. *See* Source Label Column
If function 468
ignoring
errors 314
missing values (when updating tables) 256
importance values, entering 157
importing
customized toolbars 366
data 13–37
Excel files 22
ODBC 113
options 350
SAS files 23–25
scripts 21
text files 13
using a database 26
using SQL statements 29
In Days function 488
In Hours function 488
In Minutes function 488
IN statement (SQL) 32
In Weeks function 488
In Years function 488
Include marginal statistics option 265
Include Non Matches option 245
increasing font sizes 175
Index tab on JMP Starter 4
indexes of statistics and scripting terms 450
Informat function 489
initial data values 69
initial JMP windows 331
input formats 61
insert button on keypad 293
Insert function 463
Insert Into function 463
insertion points 57, 72, 83
instruments, connecting 36, 347
Interactions Model function 493
international numeric formats 66
Internet
file formats 114
opening Internet files 36–37
Interpolate function 471
inverting selections 186
Is Missing function 301, 468
italics
column name in Columns panel 54
See also fonts
Item Analysis
button on the JMP Starter 406
menu item 439
Item function 462

J

JMP 5 compatibility 109
JMP Projects 124–127
JMP Starter 10
hiding on startup 331
menu items 446
window 397
JMP Updates 353
JMP.jmpmenu 374
JMP.PFS file 349
Johnson Sb Density function 478
Johnson Sb Distribution function 478
Johnson Sb Quantile function 478
Johnson Sl Density function 479
Johnson Sl Distribution function 478
Johnson Sl Quantile function 479
Johnson Su Density function 478
Johnson Su Distribution function 478
Johnson Su Quantile function 478
Join menu item 428
joining
by matching columns 245, 251
by row number 245
tables, methods 244
using Cartesian join 245, 250
Joint Photographics Expert Group (JPEG, JPG) 115, 121
journal
new 38
saving 116
window 114
Journal menu item 426
JPEG, JPG 115, 121
JSL functions 5, 451
JSL scripts
adding 87
creating from a report 179
deleting 52, 90
editing 52, 89
fonts 345
formula editor 315
graphics scripts 216
new 51

opening 12
running 52, 89, 425
from menus 372
from toolbars 364
saving in data tables 51
stopping 426
suppressing automatic execution 335
viewing in formula editor 315

K

Keep All option 233
keypad, formula editor 34, 291
K-means clustering. *See* clustering

L

L16, L4, and L8. *See* Taguchi Arrays
Label column in a transposed table 239
Label column name 229
Labeled and Labeled State functions 308
Labeled function 491
Labeled State function 490
labelled rows
showing in a data view 55
labels
axis 203, 345
field widths 207
icon 133, 193
markers 192
rows and columns 133, 428
tick marks 205–209
value labels 147
Lag function 456
large plus cursor 57
laser pointer 341
lasso tool 186, 445
lattice. *See* mixture design
Launch button 4, 451
Layout menu and command 120, 451
Left function 462
legend colors, assigning 151
legends 194
Length function 461
less than (>) function 468
less than or equal to (468
letters, Greek 345
LGamma function 458
library. *See* SAS transport files
Life Distribution 439
Life Distribution button on the JMP starter 406
LIKE statement (SQL) 32
limits, specification, control, response 156
line tool 213, 446
linear axis scale 201
Linear Model function 493
lines
width 197
lines, dotted or dashed reference lines 210
linked data table 185, 224
list check
memory 144
sorting data 225
list checking
cursor 58
setup 144
Little.jmp 253, 255
loading, SQL queries 33
local variables
button on keypad 294
using in formula 289, 323
locking
columns in position on data table 431
columns, preventing from being edited 143
columns, preventing from being moved 138
data tables 52, 83
Log function 457
Log window
displaying 447, 450
saving 128
Log window, saving reports to 341
Log, axis scale type 201
Log10 function 457
logarithm, natural 457
logarithmic and trigonometric functions 298
Logistic button on JMP Starter 402
Logit function 459
Loglinear Variance 435
Long Date function 489
lower control limits (LCL) and spec limits 156
Lowercase function 461

M

magnifying glass tool 196, 445
Make Combined Table command 183
Make into Data Table command 183
Make into Matrix command 184
Make Window with Legend command 194
manipulating plots/graphs 195
Manova 435
marginal statistics 265

Marker functions 308
Marker Of function 492
Marker State function 490
Marker toolbar 357
markers
adding 135
changing sizes 188
colors 188
default size 339
drawing speed/marker 189
excluding 191
hiding 191
highlighting in plots 185
labeling 192
legends 193
outlines 190
point values 194
shapes 135, 187
speed 189, 342
theme 136
threshold 342
transparency 190
Markers menu item 429
mask icon 54, 132
Match Flag column 246
Match function 325, 469
Matched Pairs
button on JMP Starter 401
menu item 435
matching
cases while searching 76
columns when joining tables 251
targets 157
values of two data tables. *See* joining
whole words in search 76
matching columns (update) 257
matching specifications 244
math symbols 345
matrix 184
Max (summary statistics) 267
Maximum function 484
MDYHMS function 489
Mean (summary statistics) 267
Mean function 483
Measure tab on JMP Starter 411
measuring units, columns 160
Median (summary statistics) 268
members, importing 25
menu bar 419
menu tips 338
menus
defaults 366
deleting 369
personalizing (Windows) 366
rearranging 367
renaming 373
running JSL script 372
saving 374
separators 371
submenus 371
tips 5
merge horizontally. *See* joining
merge vertically. *See* concatenating
merging same name columns 246
Mersenne-Twister technique 306, 485
Microsoft Word and PowerPoint 122, 177
Min (summary statistics) 267
minimum and maximum axis values 202
Minimum function 484
Minute function 488
missing
terms, in formulas 328
value comparison 301
values, in formulas 328
values, updating tables 256
missing data patterns 73
missing values
add ranges 149
mistakes, correcting in formulas 316
mixture
designs 415, 433
experiments (column property) 154
mode, marker drawing 189
Model category on JMP Starter 402
modeling types
changing 53, 60
continuous 59
icons 53
nominal 59
ordinal 59
specifying 58
Modulo function 457
mono font 345
Month function 488
moving
cells and columns 80
columns 80
highlight in data table 336
objects, Layout menu 452
rows 81
windows to back 449
multiple releases of JMP on one machine 350

Multiple Series Stack 228
Multiply To (*=) function 493
Multivariate category on JMP Starter 404–405
Multivariate menu item 438
Munger function 460
  example 324

N

N and N Missing (summary statistics) 267
N Missing function 484
naming
  data tables 83
  report tables 183
  reports 174
natural logarithm 457
NChooseK 458
NChooseK function 458
needle plots. *See* Overlay Plots
Neg Binomial Distribution function 480
Neg Binomial Probability function 480
nested variables 265
nesting boxes, formula editor 322
Neural Net
  button on JMP Starter 404
  menu item 436
new
  columns 67, 430
  data tables 10, 421
  data view 447–448
  journal 422
  project 422
  rows 66
  scripts 422
New Group 127
next selected 429
no-intercept model 154
nominal
  logistic 435
  modeling types 59
Non matches, include when joining tables 245
noncentrality 473–474, 476–477
nonlinear
  fit 403, 414, 436
  screening 403
Normal Biv Distribution function 476
Normal Density function 475
Normal Distribution function 475
Normal Quantile function 475
Not (!) function 471
not equal to (!=) function 468
notes
  as table variables 51, 84
  displaying in report windows 338
  saving in a column 143
NRow function 456
Num function 461
Number function 483
Number of Series option 228
numeric
  allowing short numeric 337
  formats 61–66
    in axes 201
    in report tables 182
    short 61
  functions 297
  international formats 66
  terms in formulas 297
Numeric functions 457
Numeric Keypad Enter Moves Down option 336

O

Object Scripting Index 451
object scripting index 5
ODBC 26, 113
ODS results 393
Offset expression 460
Oneway button on JMP Starter 402
OnOpen 88
Open All Below command 172
Open All Like This command 172
Open Database Connectivity 113
Open Office spreadsheets 13
opening
  data in text editors 19
  databases 26
  Excel files 22
  Excel worksheets 333
  existing files 11
  from the Internet 37
  Internet files 36
  JMP files 11
  JMP Starter window 9–10
  journals 11
  OpenOffice files 22
  SAS files 23, 25
  scripts 11
  text files 13
  Tip of the Day window 9
OpenOffice files 22

operating characteristic (OC) curves 413
operators
  adding 291
  description 451
  in assignment functions 493
Or (|) function 470
ORACLE synonyms 28
order of operations 310
ordering
  columns 77, 79, 431
  row order levels 155
  values 149
ordinal logistics 435
ordinal modeling types 59
orientation of formulas 319
orthogonal arrays. *See* Taguchi arrays
outlines
  adding to markers 190
  adding to report tables 181
  structure of reports 173
Output Table option
  joining tables 245
  sorting tables 226
oval tool (simple shape tool) 213, 215, 446
overlay plots 408, 440

P

page
  breaks, inserting 117, 120, 172, 177
  setup 177, 423
paintbrush tool. *See* brush tool
panels. *See* data table panels
parallel plots 441
Parametric Model Functions 493
Parametric Regression button on JMP Starter 407
Parametric Survival 435
parametric survival 439
Pareto plots 411, 443
Partition button on JMP Starter 404
Partition menu item 437
password protected data sets 25
Paste Special command 122, 178
pasting with labels (column names) 80, 425
Pat Abort function 466
Pat Altern function 467
Pat Any function 465
Pat Arb function 466
Pat Arb No function 466
Pat At function 466
Pat Break function 465
Pat Concat function 467
Pat Conditional function 467
Pat Fail function 466
Pat Fence function 466
Pat Immediate function 467
Pat Len function 465
Pat Match function 467
Pat Not Any function 465
Pat Pos function 465
Pat R Pos function 465
Pat R Tab function 466
Pat Regex function 467
Pat Rem function 466
Pat Repeat function 466
Pat Span function 465
Pat String function 465
Pat Succeed function 466
Pat Tab function 466
Pat Test function 466
paths
  defaults 348
patterns of missing data 73
peel (delete expression) 294
peel function 316
percent of total (summary statistics) 267
picture file formats 115
plain
  report table styles 182
plots and graphs
  annotations, adding 211
  appearances, altering 195
  graphics, adding 216
  markers, changing 187
  resizing 195
  shapes, adding 213
  statistics, adding 264, 266
PLS (partial least squares) 406, 439
plus icon 54
PNG 115, 121
point charts. *See* Charts
points. *See* markers
Poisson Distribution function 481
Poisson Probability function 481
Poisson Quantile function 481
Pollen.jmp 197
polygon (spline) tool 214–216, 446
Portable Network Graphics. *See* PNG
Post Decrement (--) and Increment (++) functions 493
power. *See* Sample Size and Power

PowerPoint 122, 177
precedence 310
prediction profiler. *See* Profiler
prediction traces. *See* Profiler
preferences 329, 423
preselected analysis roles 138
presentations, journal 40
Preserve SAS formats 112
Preserve SAS variable names 112
Principal Components 439
principal components
  JMP Starter 405
printing 423
  page breaks 117, 120, 177
  previews 177, 423
  reports 114
  setup 177
probabilities, adding to formulas 303
Probability functions 472–479
Probit function 475
Product function 484
Profiler 410, 442
properties 140–166
  creating with JSL 163
  removing 163
  standardizing 164
  table properties 184
Proportional Hazards 407, 435, 439
Proportional scroll bar thumb 336
proxy server settings 36, 348
pseudocomponent (mixture column property) 155
p-value indicator 176
PValue numeric format 63

Q

quality improvement. *See* Pareto plots
Quantile function 483
quantile statistics 265
quantiles, adding for formulas 303
queries, SQL 33
question mark (?) tool 3, 5
Quick Reference Guide 6
quotation marks in imported data 17

R

R&R. *See* variability
Random Beta Binomial function 486
Random Beta function 485
Random Binomial function 486
Random Cauchy function 485
random data, adding 70
Random Exp function 485
Random functions 306, 485–487
Random Gamma function 485
Random Gamma Poisson function 487
Random Geometric function 486
Random GLog function 487
Random Integer function 486
Random Johnson Sb function 486
Random Johnson Sl function 486
Random Johnson Su function 486
Random Lognormal function 487
Random Negative Binomial function 486
Random Normal function 485
random number generating formulas 306
Random Poisson function 487
Random Reset function 487
random row selection 95
random sample (subset) 223
Random Triangular function 486
Random Uniform function 485
Random Weibull function 487
range checking 58, 146
range comparison function 468
ranges, summary statistics 267
read-only data 84
rearranging
  cells and columns 80
  results 118
recoding data 72
rectangle tool (simple shape tool) 213, 446
recurrence analysis 439
Recurrence button on JMP Starter 407
red triangle icon 178
Redo Analysis command 179
redrawing windows 449
reference lines, adding 210
refreshing windows. *See* redrawing windows
Regex function 464
Regex Match function 467
relative frequency. *See* Pareto Plots
release version 451
Reliability category on JMP Starter 406
Remove Column Label 278
Remove From function 463
Remove function 463
removing properties 163
renaming
  data tables 83

report tables 183
reports 174
reordering
columns 77, 431
rows 180
Repeat function 463
Replace argument 461
replacing
tables (when sorting) 226
values in a data table 74
report tables. *See* tables
report windows
customizing 118
dates and times, adding 338
disclosure button 172–173
features 169
fonts 344
formatting 171
options 178
order of data 149, 155
rearranging results 118
red triangle icon 178
renaming 174
saving 114, 340
styles 339
tables 180
reports
closing 340
saving 340
rerunning an analysis 179
Resample Freq function 487
Reset Association button 350
resizing plots/graphs 195
response
surface design 414, 433
surfaces. *See* Contour Profiler
response limits 156
responses, multiple 157
Restore Column Label 278
restricting search to selected rows or columns 76
results. *See* report windows
Reverse function 464
Reverse Into function 464
reverting columns to original order 78
rich text format. *See* RTF
Right function 462
roles
design roles 158
preselected analysis roles 138
root button on keypad 294
Root function 458
Round function 457
row
editor 81, 175, 429
order levels 155
selection 91, 429
Row function 297, 455–456
Row functions 455–456
row state
columns 59, 165–166
data types 59, 166
Row State function 489
Row State functions 307, 489–492
row tables 276
rows
adding 66, 430
characteristics 131–140
coloring 134
context menu 79
deleting 66
editing, from a report 175
excluding 131
hiding 132
joining 244
labeling 133, 193
legends 193
markers 135
menu items 430
moving 81
order of data in reports 155
randomly selecting 95
referencing in formulas 297
selecting 90
sorting in data tables 225
sorting in report tables 180
subsetting 223
summarizing 263
transposing 237
rows panel 54–55
creating a data view of selected rows 55
RTF (Rich Text Format) files 115, 346
Run Script
menu item 425
running scripts 52, 425

S

sample data 451
sample size and power 415, 434
sample size, in tabulate 280
SAS
files 23, 25

JMP Starter 417
labels 23
saving in SAS format 111–112
transport files 111
variable names 23–24
SAS formats
preserve 112
SAS metadata server
supported version 379
SAS variable names
preserve 112
Save and Save As menu items 109, 422
Save As directory 128
save SAS formats 112
save SAS variable names 112
Save Session Script 123
Save the session when exiting command 340
saving
column property 153
data tables 109, 128
journal 117
log windows 128
menus 374
reports 114, 128, 340
reports as graphics 121
results as column values 175
results to a database 113
scripts 179
scripts in English 335
selections 425
sessions 340
spec, control, and response limits 156
SQL queries 33
toolbars 374
Unicode 109–110, 342
saving and evaluating formulas (when concatenating tables) 242
Scalable Vector Graphic format 121
scaling
axes 199
scatterplot 3d 408
scatterplots, 3D
menu item 440
Scheffe Cubic function 459
scientific numeric formats 63
Screening 436
screening designs 414, 432
screening, fit model 435
Script menu option 179
scripting index 451
scripts
graphics 216
running when a data table is opened 88
saving in English 335
See JSL scripts
scroll bar styles 336
scroll lock/unlock 138
scroller tool 445
scrolling
axes 199
locking columns in position on data table 431
Search menu item 94, 426
Search/Find 74
using the row editor 82
Search_List_Control toolbar 356
Second function 488
Select Dominant 91
Select Individual Excel Worksheets command 333
Select Randomly 91
SELECT statement (SQL) 30
Selected function 308, 491
selected rows
showing in a data view 55
Selected State function 308, 491
selecting
cells 90–93, 101, 444
columns
in data tables 430
when joining tables 245
parts of a report 172, 444
points in plots 185, 444
random rows 95
rows and columns in data tables 57, 90, 96, 425, 429
rows and columns in plots 185, 425
selection (large plus) cursor 57
sending tables or reports via email 38
separators 371
sequence data, adding 69
Sequence function 455
server settings 348
sessions
saving 340
sessions, saving 122, 340
setting
markers according to point values 194
preselected roles 430
report titles 449–450
settings. *See* preferences
severity analysis. *See* Pareto Plots
Shade State function 308, 491

shapes. *See* drawing tools
Shift function 464
Shift Into function 464
Short Date function 489
short, allowing short numeric 61, 337
shortcuts, keyboard 327
short-integer format 337
Show Tree Structure 172
showing
  boxes around formulas 322
  hidden windows 449
  results 172–173
  toolbars 37, 447
Sigma, assigning values 159
signal and noise factors. *See* Taguchi Arrays
simple shape tool (oval or rectangle) 213, 446
simplex mixture design. *See* mixture designs
simplify formulas 312
Sine function 459
SinH function 460
sizing/scaling 196
slope computation 323
Sort context-menu command 79
Sorting
  results by fields in a database (SQL) 31
sorting
  data tables 225, 427
  list check 225
  order 226
  report table columns 180
  value labels 225
  value ordering 225
source columns 242
Source Flag column 246
Source Label Column 229
spec limits 156
specifying
  graphic formats 346
specifying columns when importing text files 18
speed, marker 189, 342
spinning plots 408
  menu item 440
splash window 331
Split By column 233
Split Label Col 232
splitting columns 232, 427
SQL statements 29–30
SQL WHERE clause editor 33
Squish function 457
stacking columns 227
Standard Deviation 267
Standard Deviation function 483
Standard Error 267
standard least squares 435
standardizing, attributes and properties 164, 431
Starts With function 462
startup windows 331
statistical
  functions 305
  index 4, 451
Statistical functions 481–484
Statistics button 264, 266
statistics column 264, 266
status bar 447
Std Dev and Std Err (summary statistics) 267
Std Dev function 483
Step function 471
Stepwise 435
stopping scripts 426
stripping enclosing quotes on imported data 17
subgroups, summary statistics 265
submenus, customizing 371
Subqueries (SQL) 33
Subscript function 456
Subset menu item 427
subsetting
  from a data table 223
  from a histogram 225
Substitute function 464
Substitute Into function 464
Substr function 461
Subtract To (-=) function 493
Sum function 483
Sum Wgt (summary statistics) 267
Summary menu item 427
summary table, creating 264
Summation function 483
supported version of SAS metadata server 379
suppressing formula evaluation
  in data tables 52
  on open 334
  when creating a subset 224
  when creating formulas 313
  when joining tables 246
  when splitting columns 233
  when stacking columns 229
surface plots 444
Survival 439
survival
  analyses 439
SVG 115
switch terms button on keypad 294

symbols, math 345
synonyms (ORACLE) 28
system tables (ORACLE) 28

T

t Density function 476
t Distribution function 476
t Quantile function 477
table variables
  adding 84–87
  creating 51, 85
  editing 86
  in formulas 84, 288
  notes 84
tables
  concatenating 241
  fonts 344
  menu item 427
  panel 50, 53
  report tables 180, 183, 345
  See also data tables
  toolbar 356
Tabulate 269–284
tabulating data 269
Taguchi arrays 415, 433
Tangent function 459
TanH function 460
target value 156–157
terms, formula 328
terms, switching in a formula 294
ternary plots 409, 442
text
  editing windows 19
  exporting 110
  importing 14, 350
  mode for formulas 315
  opening text files 13
  saving as text 110
three-dimensional scatterplots 408
  menu item 440
threshold of markers 342
thumb styles 336
tick marks 205
tile windows 448
tiling windows 448
Time of Day function 488
time series 403, 437
  See also Multivariate
time, adding to reports 338
Tip of the Day window
  description 6, 9
  hiding and showing 331, 338
title bar fonts 345
Today function 488
toolbars
  adding buttons 362
  adding toolbars 360
  Analyze toolbar 355
  deleting buttons and toolbars 359–360
  File_Edit toolbar 355
  importing 366
  personalizing (Macintosh) 354
  personalizing (Windows) 354
  rearranging toolbars and buttons 357–358
  running JSL script 364
  saving 374
  showing and hiding 355
  Tools toolbar 355
  types of 355, 444
tools, cursor 57, 211, 444
Topic Help button 4
Topic Help button in Statistics Index 451
traditional scroll bar styles 336
Transcendental functions 457–459
transcendental functions 298
transparency, markers 190
transposing rows and columns 237, 427
tree map 441
Trial1.jmp 247, 253
Trial2.jmp 247
triangle icon 178
Trigamma function 459
Trigonometric functions 459–460
trigonometric functions 298
Trim function 461
truth tables 471
Tukey HSD P Quantile function 479
Tukey HSD Quantile function 479
tutorial 3
tutorials 451
  creating formulas 321
  learning JMP 3
two-digit year rule, importing data 17
two-way table of summary statistics 265

U

unary sign function button on keypad 294
Undo command 316, 424
Ungroup command 120, 452
Unicode 109–110, 342

units 160
univariate statistics 264, 266
update
  matching columns 257
updating data tables 256
upper control limits (UCL) 157
upper spec limits 156
Uppercase function 461
URL_List toolbar 37–38, 356
US Population.jmp 289
Use Excel Labels as Headings 333
User Tables, database connections 28

V

validating data 144–147, 431
value colors 151
value labels 147
  sorting 225
value ordering
  sorting data 225
values
  high and low for columns (in DOE) 153
  minimum and maximum 202
  ordering 149
Variability button on JMP Starter 411
Variability/Gauge Chart menu item 443
variable names 23
variables
  local 289
  table. *See* table variables
Variance (summary statistics) 267
version number 451
versions, multiple versions of JMP 350
vertical, formula display 319
View menu 446–447
viewing
  subset of rows in a data view 55
Views, database 28

W-Z

web page, JMP 451
Week of Year function 488
Weibull Density function 477
Weibull Distribution function 477
Weibull Quantile function 478
weight, preselected roles 139
weight, response importance 157
WHERE clause editor 33
WHERE statement (SQL) 31
While function 471
widths
  field width of columns 183
  fields in report tables 182
  fixed width incoming data 15
  tick mark labels 207
Window list 446
windows 331
  arranging on desktop 448
  colors 343
  JMP Starter 331
  menu 448–450
  redrawing/refreshing 449
  splash 331
Windows list 332
Windows Metafile 115, 121
WMF (Windows Media File) format 115, 121
Word function 462
Word. *See* Microsoft Word
Words function 462
worksheets and workbooks (Excel) 333
worksheets, selecting 333
WWW. *See* Internet
Year function 488
yellow tag icon 54, 133, 193
zooming 196